MOTOR AGE

Vol. XXXI
No. 17

CHICAGO, APRIL 26, 1917

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In This Issue—What Becomes of the Old Cars

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MOTOR AGE

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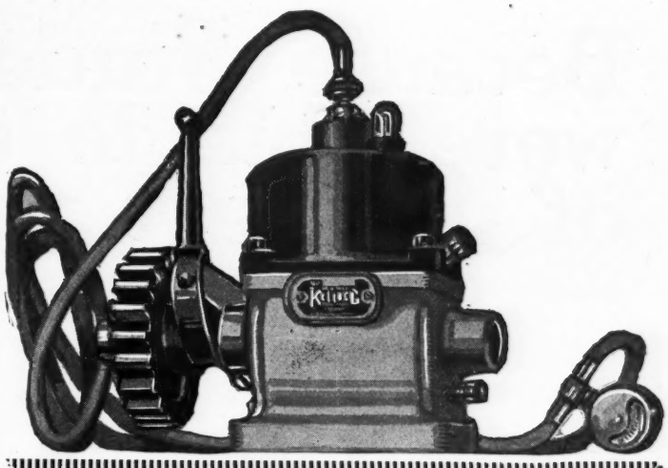
ANNOUNCEMENT

The weaknesses of American and foreign cars in war service will be the feature of Motor Age for next week. The story is the result of a critical study of motor cars and trucks on the Italian front made by our special European correspondent, W. F. Bradley, while he was in the Italian ambulance service.



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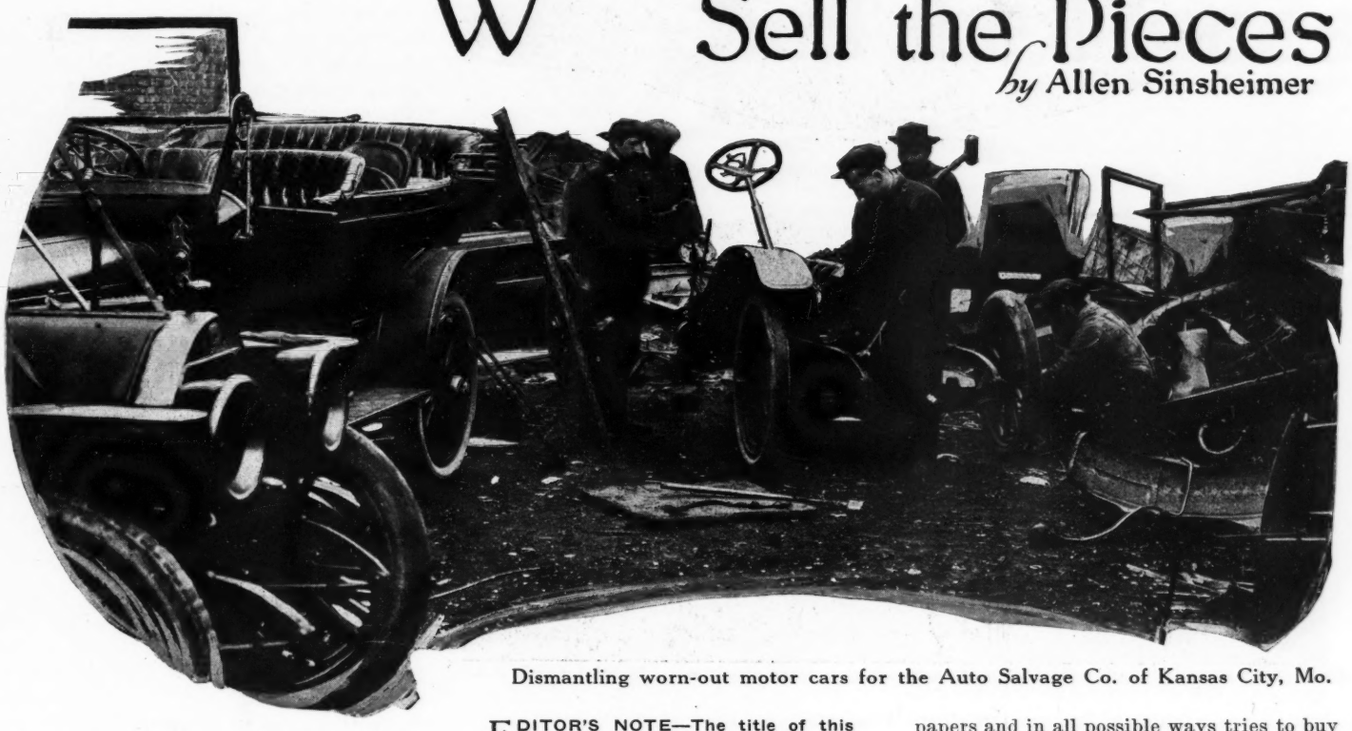
MOTOR AGE

We Tear 'Em Up and Sell the Pieces

by Allen Sinsheimer



Dismantling worn-out motor cars for the Auto Salvage Co. of Kansas City, Mo.

YOU remember the pin problem that perplexed you during school-days? There were more than a billion pins made yearly, you were told, and you wondered what became of those used and discarded.

Recently a similar conundrum was asked. What becomes of old motor cars was the riddle. Someone discovered that 4,500,000 motor cars have been sold in the United States while but 3,500,000 are now in use —hence the problem of the missing million and its solution, which proves both interesting and unusual. It is the story of the surgeons of motordom—the car wreckers —who dismember deceased cars with sledge-hammer lancets and screw-driver scalpels and graft the vitals on other machines suffering from partial disability.

"There goes more kindling wood," says the bystander at a collision, and he expresses the view of all who know nothing of the car wrecking industry. There are car wreckers in every large city—men who constantly seek wrecked or disabled cars and who buy and wreck them and sell the parts for use in newer models. They perform an invaluable service to the motorists who ruin gears, smash wheels, fracture crankshafts or otherwise injure their cars. From them they can obtain serviceable parts without loss of time and at a fraction of the cost of new parts.

EDITOR'S NOTE—The title of this article so well answers the question "What becomes of the old cars?" that we may be pardoned in adopting for it the slogan of one of the representative firms engaged in the profitable utilization of vehicles which now have outlived their usefulness as such.

Wrecking cars has become an industry in itself, employing more than 400 workers, thirty concerns and involving business amounting to hundreds of thousands of dollars yearly.

The mystery of the missing million developed when the models made in the early years of the motor car industry became obsolete and when traffic became heavy and speeders grew in numbers. The car wrecker thrives on accidents, collisions, ruinous skids—anything that damages the car beyond repair. He keeps in constant communication with garages, watches daily papers and in all possible ways tries to buy up the wrecked cars as quickly as they become available.

A few weeks ago a taxicab traveled at 20 m.p.h. through the main artery of Detroit. A speedster negotiating 65 m.p.h. was devouring space through a side street. The two cars met at the crossing. The taxi tried to climb a telephone post. The speedster after a hurried waltz of seven revolutions collided again with a street car. The accident occurred at midnight. At 7 a. m. both cars were in the wrecking yard—the operating room—of a car wrecker.

Three workers with sledge hammers and screw drivers commenced the operation. They worked for 5 hrs., carefully removing each part and laying it aside in a classified order, until the yard looked much like a battlefield with the bones of the dead cars scattered about. Next they were inspected and again classified. Those found perfect were placed in bins in the car wrecker's store, and the others were set aside to be sold for junk. That is one example of how the wrecker works.

New building of the Auto Salvage & Exchange Co., Inc., which is at Des Moines, Iowa

This illustration shows the annex, or graveyard, as some call it, of the Auto Wrecking Co.

Another instance of the car wrecker's work is shown in the case of C. E. Johnston of Pittsburgh. Mr. Johnston had a car he wanted to sell. Its price was $350. There were no buyers, and he dismembered it, selling the parts for $450, a profit of $100 over the second-hand price.

Growth has been the history of practically every company in the wrecking business. The Auto Parts Co., St. Louis, Mo., starting in business two years ago with 6000 sq. ft. of floor space and three employes, to-day occupies 16,000 sq. ft. of space, employs twelve men and wrecks ten cars a week. This company carries a large stock of parts for cars dating in manufacture from 1908 to 1914 and transacts both a city and mail order business.

The Auto Salvage Co., Inc., of Kansas City., St. Louis and Cincinnati began its business in 1911, occupying at that time a single floor in Kansas City, with a floor space of 3100 sq. ft. To-day it occupies a three-story and basement building in Kansas City, two floors and basement each 48 by 85 ft. in St. Louis and two floors, 25 by 125 ft., in Cincinnati. The company wrecks from 350 to 450 cars a year and employs twenty-four men as compared with three men during its first year. Its parts department is equipped with every modern device, and large wood bins are employed throughout each store, where all parts are classified and stocked. The majority of cars wrecked are standard, popular cars manufactured since 1912. The company issues a catalog of its parts in which it lists motor car parts of every description, including crankcases, disk clutches, axles, transmission cases, ball bearings, gears, cylinders, radiators, magnetos, connecting rods and so forth. It carries a complete stock, having on hand, for example, connecting rods for sixty-two different makes of cars, including the different models of each. The catalogs are issued monthly and are mailed throughout the country, allowing car owners to order just what they need by mail. Prices of the various parts are said to be from 50 per cent to 75 per cent lower than the list price of new parts.

The Auto Salvage & Exchange Co., Inc., Des Moines, Iowa, started its business eighteen months ago, when it opened a store which in less than six months was filled from floor to ceiling with the parts of cars which had been purchased and wrecked. The company realized that it required system in its business and that haphazard searching for gears or axles in the great heaps was causing a loss of time and money and it installed a complete and efficient method for keeping books and records and for classifying and sorting the different parts.

It has had several blank forms printed, which display all work performed and stock on hand. One blank is given to the wrecking foreman at the time of the delivery of a car to him. It provides a complete history of the condition of the car

This car, which was wrecked by a train, will be torn down and its serviceable parts salvaged by the Auto Wrecking Co.

when disassembled, lists all the various parts taken from it and contains a separate column where all parts found useless are classified as junk. Another blank is used for stock listing, and since it records every article placed in stock and is indexed and filed, the company is able to discover quickly just what parts it has on hand and is in a position to take care of rush and long distance orders promptly.

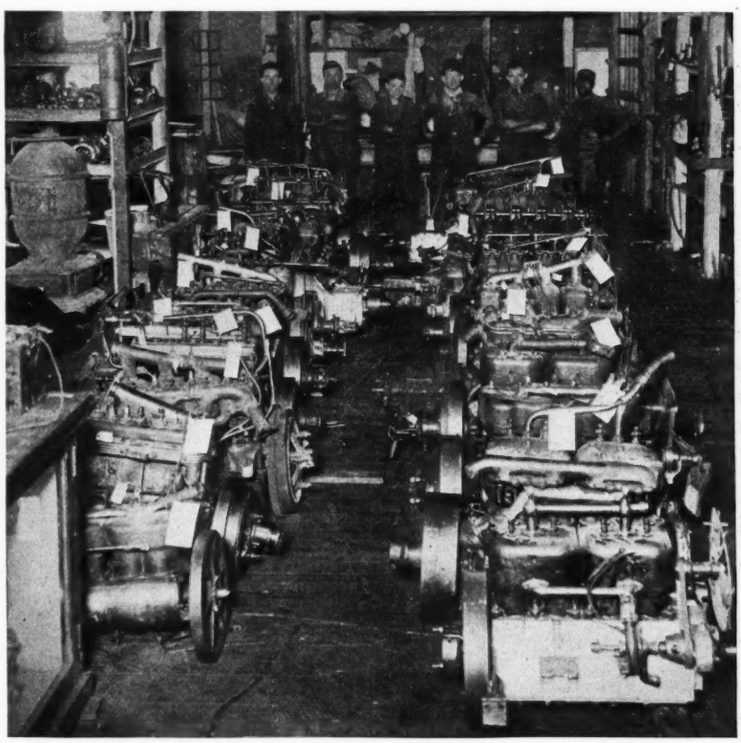
Its wreckers are instructed to exert considerable care in their work, since carelessness results in the springing of a crankshaft or the fracturing of a crank, which would cause the loss of the value of those parts. Every part is tagged and shelved in the stockrooms by a system that allows the stockmen to find them easily and promptly. The company maintains a correspondence card system and follows up every inquiry by mail. In addition, it has an emergency car which is used for rush orders so that a customer who is waiting for a part can telephone his order and have it filled and delivered immediately.

''We tear 'em up and sell the parts'' is the motto of the Auto Wrecking Co. of Kansas City, which started ''tearing 'em up'' in 1913. The company started on a small scale by buying a model F Buick that had been scorched in a fire. It removed the body and sold the chassis for $90 a day later. After running a year, this car again was bought in, traded to another motorist and finally returned for the third time, when it was wrecked and sold part by part. Since that time the company has developed rapidly, buying up many makes of cars until it now has a large and complete stock of parts for practically every make and model. It has increased its business greatly by advertising and mail order and attributes success to the rule that money is refunded on every purchase the customers find unsatisfactory.

Front side view of Auto Wrecking Co. building, showing wrecking truck bringing in a burned Lexington, and wrecks of Lewis Six and other cars to be torn up

The company carries sufficient stock on hand to supply 85 per cent of the demands made on it and sells its parts at from 50 per cent to 75 per cent from the list prices of new parts. To increase its capacity it maintains a buyer in the eastern section of the country, who constantly seeks for job lots, bankrupt stocks and old and wrecked cars. These purchases include anything in the motor car field and run from 1000 tail lamps to a carload of fenders or a load of old or wrecked cars.

At present the company wrecks five cars daily and carries a stock of $100,000 worth of parts on hand. The business is divided into six divisions, including the sales, buying, engineering, auditing, stock and wrecking departments, each in charge of a competent director.



Part of the stock of rebuilt engines the Auto Wrecking Co. has assembled

Started in 1907

''We are the oldest car wreckers in the business'' is the claim of the Auto Salvage and Parts House of Chicago, and its record of starting in 1907 would seem to give stability to that assertion. This company commenced the motor surgery business by buying twenty-eight Pope-Toledo cars which had burned in a garage fire. It wrecks 150 cars a year and occupies 12,000 sq. ft. of floor space.

Beginning its first year, it found the wrecking business unprofitable. In fact, the president of the company has no hesitation in saying that it was sometimes hard to discover sufficient profit to pay for three meals a day. The floor space occupied was 800 sq. ft. and two men did all the work. As cars became obsolete and wrecks grew more frequent, the three meals a day became more stable, while the company found it was spreading in various directions over Wabash avenue.

All parts are kept in tagged bins, and

ALL KINDS OF SECONDHAND
AUTOMOBILE PARTS
SOLD AT JUNK PRICES.
PHONE I'M THE GUY 2817.
That Put The Junk In The Junk Shop.
All Kinds Of Second-Hand Automobiles Bought-Any Shape.
We Also Carry A Full Line of
Parts For Every Known Make.
MONTCLAIR N.J.

How the Guy Auto Exchange advertises its trade. This company is about seven years old and operates on between 300 and 400 cars a year

the company maintains an efficient bookkeeping and sales record. Motors are usually kept intact when cars are wrecked and are sold for boating, stationary and tractor purposes. Cars are wrecked in 15 hrs. each on the average, which includes the sorting and cleaning of every part. Business is obtained by mail order, advertising and through the company's store.

Rapid growth marks the record of the Progress Auto Parts Co. of Cleveland, where the company started in 1913 with one employe and 2400 sq. ft. of floor space and now has six employees and 15,000 sq. ft. of floor space. This company does a business of $20,000 yearly and maintains its stock and offices efficiently by bins and various systems. Its average time for dismembering a car is 6 hrs. to one day. Cars have been wrecked dating in make from 1898 to 1917, the 1898 model having a single-cylinder vertical engine.

The Badger Auto Parts Co., Milwaukee, Wis., commenced its business in 1914 and wrecks 500 cars a year. This company transacted a business of $5,000 in its first year and in the short time succeeding has increased 600 per cent and now does more than $30,000 annually. Starting with one worker it now employs ten and has a system of shelves which are labeled to show the contents. Customers are obtained by mail, and an efficient follow-up system is employed.

"I'm the guy that put junk in the junk shop," says the Guy Auto Exchange of Montclair, N. J., and a glance at his trucks and wrecking yard proves that he tells the truth. The Guy exchange started operations in 1907 with 600 sq. ft. of floor space and now does surgical work on between 300 and 400 cars a year. At present it occupies 2000 sq. ft. of inside floor space, besides employing two large trucks which it uses to haul or tow wrecked cars from as far as 300 miles distant.

Thirty Cars a Month

From 2 to 3 hrs. is sufficient time for two employees to wreck a car in the Guy exchange yards. The company's record of car wrecking is a gage of its rapid growth. In 1907 one or two cars were wrecked a month, while in 1910 five cars were dismembered a month, and at present thirty cars make the monthly average.

The Guy Auto Exchange started business with $10. At that time old cars were to be had for from $10 to $15 each. Now the company pays as much as $300 for a car it will wreck. Starting with one small shed, the business has grown until it now occupies two buildings, one 60 by 90 ft. and the other 30 by 90 ft., besides a store 32 by 44 ft.

Besides these companies there are many others which have stories of growth and efficient organizations of the same caliber.

One of the scrap heaps of worn-out motor cars. It belongs to the Auto Salvage Co.

They are scattered throughout the country and, as are these which have been mentioned, are always ready to give good service and prompt response to inquiries for parts.

Other companies in the car wrecking business include the Maxwell Brothers' Auto Salvage Co., St. Louis, Mo.; the Auto Parts Co., Omaha, Neb.; Auto Wrecking House, Chicago; L. & M. Auto Wrecking Co., Cleveland, Ohio; Boston Auto Parts Co., Boston, Mass.; Cedar Auto Parts Co., Cleveland, Ohio; Glassier Auto Parts Co., Washington, D. C.; Tuxedo Auto Parts Co., New York City; C. E. Johnston, Pittsburgh, Pa.; New England Auto Parts Co., New York City; Cleveland Auto Parts Exchange, Cleveland, Ohio; E. W. Saunders, Boston; Ablisky Auto Parts Co., Cleveland, Ohio; Auto Parts Co., Philadelphia, Pa.; Dougherty Parts Co., Philadelphia, Pa.; Warshawsky & Co., Chicago; and the Auto Parts Co., St. Louis, Mo.

The assortment of serviceable parts in the salesroom of the Auto Salvage Co. gives an idea of the good in worn-out cars

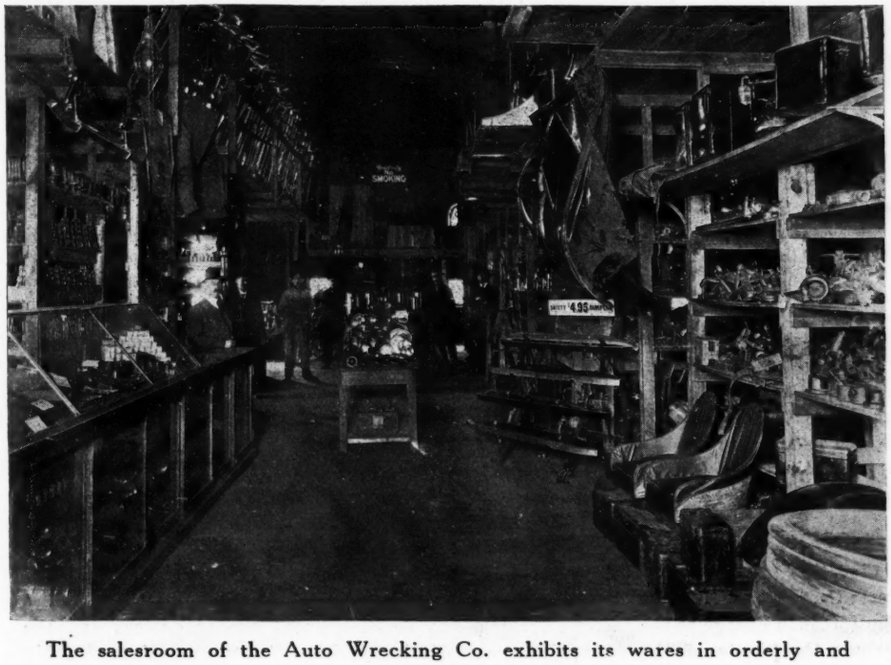
MORELAND TO BUILD PASSENGER

Los Angeles, Cal., April 15—Immediate construction of the first unit of the Moreland Motor Co.'s projected $1,000,000 plant at Burbank, a suburb of this city, is to begin at once. The site has been negotiated for, and officials of the company say the first building, which will cost $150,000, will be complete and ready for occupancy by Sept. 1.

The announcement is made also that the Moreland company will depart from its custom of operating an assembly plant for commercial vehicles and enter on the complete manufacture of cars of this class and, in addition, will build a light passenger car designed to burn distillate and sell at a moderate price. The present assembly plant in this city is to be retained. Parts, including engines, transmission appliances, sheet metal coverings, drop forgings and everything except the standard units that are used in motor vehicles, farm tractors, marine and stationary engines will be made, according to an official of the company.

TRACTOR MAKERS DEMONSTRATE

Bloomington, Ill., April 21—Enterprising tractor manufacturers of Illinois are taking advantage of the slogan to help win the war by raising more food, and are arranging demonstrations of non-stop endurance tests in plowing, which enables the farmers to work day and night shifts. A test was made this week on the Roth farm near Morton. A Barrett tractor plowed the entire field of 65 acres without stopping the engine, requiring 65 hrs. Lights were installed around the field for the night plowing. Due to backward weather in Illinois, spring plowing has been delayed, and the ability to plow both night and day will enable the agriculturists to catch up with their work and all grain planted in ample time to germinate. Many thousand acres, previously in grass or which were not utilized for grain or other foods in former years, are being plowed this year, complying with the plea of the government for an increase in the output of foodstuffs. It is estimated that 100,000 additional acres will be plowed in Illinois this spring as a result of the propaganda from the government to raise more grain and other foodstuffs. This activity is helping to sell tractors, and all manufacturers are reporting increase in orders for this class of farm machinery.



The salesroom of the Auto Wrecking Co. exhibits its wares in orderly and attractive assortment

BRITISH BUY 150 MACKS

New York, April 23—The British government has ordered 150 5½-ton Mack chassis of the bull dog type from the International Motor Co. The trucks will be standard in every way.

SPRING STYLES IN JORDANS

Cleveland, Ohio, April 20—Apache red, savage red, ocean sand gray, submarine gray, Italian tan, Egyptian bronze, Chinese blue, Venetian green, apple blossom—but what's the use? Spring has come to the Jordan motor car as well as to the country at large, and this is a partial list of the body colors that a limited number of purchasers can have on Jordan cars.

Spring explains, at least partly, the offering made by the Jordan Motor Car Co. in color schemes, for this time of the year above all others quickens the taste for color. Only twenty-five cars are offered to be finished in any color or any combination of colors that the purchaser's personal preference may choose. Ten color schemes are presented to help in making a choice. The tones that sound so tuneful of spring are among them. The idea is much like that of the fashionable milliner or dressmaker, who, while perfectly willing to produce anything a customer may call for, suggests several well-considered designs as aids to choice. The principle of the plan is good. In many cases a prospect confronted with an opportunity to select any color in the world will be absolutely at a loss which way to turn, but a timely suggestion will get him started and will help him crystallize his ideas.

An added incentive lies in the knowledge that only twenty-five cars will be sold under the plan. Each purchaser will have the highly gratifying consciousness of possessing a car that is not likely to be mistaken for any other car. None of the color schemes are to be out of harmony; they are effective—and tasteful for all their dash and splash.

E. A. BUYS NEWTONE

New York, April 23—The E. A. Laboratories, Inc., accessory maker, has bought the business of the Automobile Supply Mfg. Co., maker of Newtone horns, together with its patents, trademarks, good will, unfilled contracts and orders on hand. The plant of the Newtone concern has been sold to Louis Leavitt, a Brooklyn paint maker, who paid $137,500 plus incidental expense.

The Automobile Supply Mfg. Co. started manufacturing the Newtone horn in 1904. The company will be remembered for its participation in the suit brought against it in 1904 by the Lovell-McConnell Co., maker of the Klaxon, when it was charged with having infringed the Miller Reese Hutchinson patents.

TO STUDY FOREIGN MARKETS

New York, April 23—Tom O. Jones of Indianapolis, Ind., has been chosen to investigate the motor markets in the Far East for the Bureau of Foreign and Domestic Commerce of the Department of Commerce. Before sailing he will visit the principal motor car centers in this country to familiarize himself with the export problems of the manufacturers with headquarters at 409 Custom House, New York. His foreign study will include China, the East Indies, Africa and Australia.

Mr. Jones has been in the export and American motor car business for several years and made a previous trip to the Far East for an American motor car concern.

Fly at Chicago Speedway

Race Oval Will Train Aviators and Chauffeurs for the Army

Wright Biplane and Sturtevant Are in Equipment

CHICAGO, April 24—Within another month the Chicago speedway will be the Campus Martius, not the Circus Maximus, of the city. Officials of the Chicago speedway, aiming to make the local course the American Brooklands and as valuable to our military authorities as is the English track to the war lords of Briton, already have established an aviation school there and now announce that they will use the tamarack oval for the instruction of army chauffeurs.

The school for military drivers is somewhat of an innovation. The course consists of lessons by correspondence in motor car mechanics, followed by practical application of this knowledge on the speedway. Dario Resta has been offered the position of chief instructor and, if he accepts, will choose his assistants from the galaxy of race drivers that now are awaiting the call to the colors.

Students in the military chauffeurs' school will be taught how to drive a car at high speed and on graduation are expected to be so well versed in the car that when in the field they will be independent of the garage if a tire or wheel must be changed, a carbureter adjusted or faulty ignition corrected, work that must be done quickly and sometimes under fire.

Several students already are enrolled in the aviation school, which opened Saturday. Hangars have been built, and the equipment now includes a Wright biplane and a Sturtevant-motored machine. William V. Skall, who rode as mechanician with Frank Galvin last season, has been appointed chief instructor. He is an aviator of five years' experience and at the present time is subject to call from the Imperial Royal Flying Corps of Canada. Tharis Weiner is his assistant, and the construction work and mechanical department is in charge of Frank Pontkowsky, an airplane maker.

The course at the Chicago speedway aviation school consists of ten preliminary lessons, costing $100. When these are finished, the student may qualify for a pilot's license in the Aero Club of America by 4 hrs.' continuous flying. There is an additional charge of $150 for this.

OPENS CLEVELAND OFFICES

Cleveland, Ohio, April 21—The Standard Parts Co. has opened executive offices here. The forces in charge at the factories, which include the plants of the former Perfection Spring Co., Standard Welding Co., Western Spring & Axle Co. and the Bock Bearing Co., are not affected directly by the opening of these headquarters, however. They will remain unchanged for the most part.

The offices of President Christian Girl; Dan C. Swander, general sales director; J. G. Utz, director of engineering; Horace H. Newsom, director of purchases; J. H. Liston, manager of the jobbing department; E. R. Finkenstaedt, assistant to the president; and James A. Bradden, special publicity, will be at Cleveland. An auditor, yet to be appointed, will complete the executive office personnel. Secretary P. A. Connolly will have his headquarters at the Perfection Spring Division plant still.

The Standard Parts Co. is now one of the largest makers of parts for motor vehicles in the industry and includes springs, axles, rims, tubular parts, bearings, etc., among its products. Its twelve factories employ 8000 persons and a working capital of about $22,000,000.

EMPIRE INCREASES PRICES

Indianapolis, Ind., April 23—The Empire Automobile Co. will advance the price on its model 70 light six $50 May 1.

BILL RETURNS TO CHALMERS

Detroit, April 23—Harry L. Bill has returned to the Chalmers Motor Co. as works manager. In 1909 he was in the engineering and experimental departments of the Chalmers company, and it was largely due to him that the Chalmers racing team was awarded the championship by the A.A.A. contest board that year. Mr. Bill, since leaving Chalmers, has been factory manager for the Disco Starter Co., general manager and director of the Hayes Mfg. Co., and vice-president and general manager of the Springfield Metal Body Co. Though only thirty-five years old he has been identified with the industry for seventeen years and is one of the best known men in the industry. He has been responsible for several innovations in the way of modern methods of quantity production and is recognized as possessing special ability along these lines.

MANLY ANNOUNCES NEW PRICES

Chicago, April 23—The Manly Motor Corp. has announced the following list of prices to take effect May 1: Model 30, 1½-ton, $1,800; Model 50, 2½-ton, $2,250; kerosene burning equipment, $100; electric starting and lighting, $125; electric lighting only, $75; inclosed cab in place of seat, $35. The concern has moved its offices from Chicago to its factory at Waukegan, Ill.

MAXWELL ECONOMY DAY

Detroit, April 20—The Maxwell Motor Car Co. has fixed May 23 as national economy day when $5,000 in cash prizes are to be distributed among dealers and the National Maxwell Economy Championship Cup is to be awarded.

Owners' cars only will be used. The dealers must agree to arrange for the use of two Maxwell five-passenger touring cars now in owner's service, which he is to borrow for the day. The two cars will make the run together, each carrying four full-grown passengers, including the driver and three official observers. Two 1-gal. gasoline tanks will be provided each participant and will be attached to the windshield. Every report will bear the affidavits of the three observers. The prizes will be: First prize, $200 in gold; second prize, $150; third, fourth and fifth prizes, $100 each; sixth and seventh prizes, $75 each; eighth, ninth and tenth prizes, $50 each.

JOE DAWSON WITH CHALMERS

Detroit, April 21—Joe Dawson, racing driver, has joined the Chalmers Motor Co. as assistant experimental engineer, with special duties in the new contest and trial section of the advertising department. Dawson won the 500-mile contest at Indianapolis in 1912 and won an heroic name for himself in the Hoosier classic of 1914 when he risked his life to avoid hitting Lino Bonani, the mechanician of the overturned Isotta car. Dawson has been connected with the Marmon company in its engineering department.

MONROE INCREASES CAPITAL

Pontiac, Mich., April 24—The Monroe Motor Co., has increased its capital stock from $1,000,000 to $2,000,000. The matter of par value on this stock has not been settled as yet. The board of directors is increased from five to seven. The two new directors are both distributors of Monroe cars, one being William Small of Indianapolis, Ind., and the other L. S. Frint of Milwaukee, Wis.

The price of the car is increased from $985 to $1,095 on Models M-4 touring and M-5 club. The price on the small models remains $565 for the roadster, $635 or the club and $965 for the sedan.

The Monroe stock is held quite closely and it is believed that the additional $1,000,000 will be absorbed quietly without an extensively advertised public sale.

The company is in a prosperous condition at the present time. Fifteen of the new M-4 touring cars are being put out a day and about ten of the small models, making a total of twenty-five. This will be increased after the first of May to a total of thirty-five cars. The Monroe Motor Co. recently took in the plant of the Auto Top & Trim Co. of Pontiac and owns in addition its engine plant in Port Huron, Mich.

PRINCESS PRICES INCREASE

Detroit, April 21—The Princess Motor Car Corp. has announced an increase in the price of its models from $775 to $825, effective May 1. The five-passenger touring car, three-passenger roadster and four-passenger club are affected.

Auto Derby Is Assured

Chicago 250-Mile Event for $21,000 Purse Will Be Held June 16

Entry Blanks Are to Be Mailed This Week

CHICAGO, April 20—After a month of impatient waiting and enforced inactivity, due to the declaration of war, Chicago's third annual Auto Derby is assured, and it will be held on the Chicago speedway, June 16. This is a week later than originally intended but will give the officials an opportunity to postpone the derby to June 23 if rain spoils the earlier date. The race will be for 250 miles with a purse of $21,000, the first ten drivers to finish dividing $20,000 and $500 going to the leader at the end of 100 and 200 miles.

Entry blanks will be sent out next week, the ticket agencies already are being established in and around Chicago. There will be 1000 of these. The scale of prices is: Box seats, $10, $8 and $7; grandstand chairs, $5, $4 and $3.50; bleachers, $1.50 and $1; parking space, $10 and $5; and paddock, $2.

President David F. Reid is confident that the war preparations will not interfere with the success of the derby. The drivers and mechanicians who have volunteered for military service either as airplane pilots or chauffeurs of armored cars probably will not be called to the colors until the middle of the summer, it is believed.

CINCINNATI GETS RACERS

Cincinnati, Ohio, April 23—Cincinnati is going ahead with arrangements for its big race of the year, May 30. Among the drivers who have promised to take part are Josef Christiaens, Enrico Cagno and Jack Scales, all of whom are now in Europe, Eddie Rickenbacher, Ralph de Palma, Louis Chevrolet, Earl Cooper, Fred Duesenberg and, according to the management, Dario Resta, who was declared recently to be out of the racing game.

Detroit, April 23—Barney Oldfield has entered for the Uniontown speedway race of May 10 and will enter for the Cincinnati speedway race of May 30. He will drive his old Delage.

HIGH-PRICED CAR SHORTAGE

Detroit, April 20—Although at this time the Government has made no demands on the manufacturers of high-priced cars, it is anticipated that there will be a serious shortage of that class of motor car by the early fall. Labor already is being diverted to farming and munitions manufacturing purposes, and the scarcity is being felt at Detroit. In addition, it is expected that the Government will demand the highest quality of materials in all motor products manufactured for it and as a consequence will produce a shortage of cars ranging in price from $2,000 up. Car makers who have large stock of parts and materials on hand are congratulating themselves, and several, it is rumored, who are not so fortunate, already have been obliged to reduce their output. Data on the situation is not yet available, since the Government has not specified its complete requirements. It is expected that another thirty days will reveal how much of a shortage may be expected this fall.

DE PALMA MFG. CO. REORGANIZES

Detroit, April 21—Ralph de Palma has disposed of his interest in the De Palma Mfg. Co. and will race this year on his own account. He will continue to act in an advisory capacity to the company, however. The officers now are: President, Frank Book; vice-president, Herbert Book; secretary and treasurer, C. W. Toles. In addition to rebuilding de Palma's old Mercedes car and two other racers it will make engines for airplanes.

AMATEUR RACES MAY 30

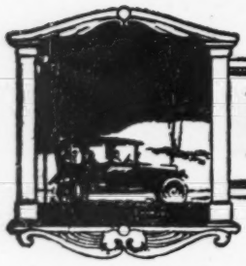
Cincinnati, Ohio, April 23—With the award of the May 30 date to the Cincinnati speedway many requests for an amateur drivers' race were received by the officials, and a program of three amateur races is being planned. The first will be for cars costing less than $1,000; the second for cars between $1,000 and $1,500 in value; and the third for cars costing more than $1,500. Prizes will be offered in each event, and the races will precede the 250-mile race. Another feature in preparation is an aviation exhibition.

FORD DEMURRER OVERRULED

New York, April 23—Henry Ford was defeated in the Federal court to-day in the suit for libel brought by the Vitagraph Co. of America, asking for $1,000,000 damages for Mr. Ford's utterances, which the court held cast discredit on the film "The Battle Cry of Peace." The court overruled the demurrer filed by Mr. Ford's attorneys and granted a motion of the plaintiff for judgment on the pleadings. At the same time the court gave the defendant twenty days to file an answer. The suit is the outgrowth of an article entitled "Humanity and Sanity," which was given currency by Mr. Ford last May and in which he made certain observations on motion pictures which the Vitagraph company alleged were direct condemnation of one of its films.

TO OPEN MARQUETTE PLANT

Saginaw, Mich., April 23—The meeting in Saginaw of W. C. Durant and associates held last week will result in the opening of the large factory building formerly occupied by the Marquette Motor Works. This information is based upon a positive statement made by Mayor H. T. Paddock of Saginaw.



EDITORIAL PERSPECTIVES

Lest Haste Make Waste

THERE is one feature connected with the hasty assembling of armies in a crisis like this due primarily to lack of proper preparedness and sure to militate in the end against the best interests of a country, from a military standpoint. In the effort to raise a large army and greatly increase our naval forces and other direct arms of the national defense we may overlook the proper mobilization of the brain and other factors. This particular feature is not one that applies to motorists as a whole: in all probability to the average motorist service can be given directly to some arm of the military forces. It does, however, apply to the motor industry as a producing unit. The industry has two major tasks ahead of it. The first of these is the complete provision of army transports; the second is the manufacturing of airplanes.

THE most important is the need for the right men at the head of organization. True, we are fortunate in having at the head of the national advisory council, and similar committees, the biggest and best brain of the industry. It is also true that the Government is working in close harmony with these men, but we are in danger of suffering, as the English suffered during the early part of the war, from too many commissions and committees that duplicate each other's efforts, interfere with each other—even working against each other for public approval. After muddling for a long time, England finally picked from her industry a few big men, who organized themselves and the industry, and to-day transport for the army in England is handled, and handled well, by the brains of the motor industry. But England lost many months of valuable time in getting this arm of the service into united action.

FRANCE, too, suffered from a similar difficulty. One instance which shows how men are enlisted at the expense of brain power and expertness is recorded in the following news note. It is reported herewith and carries its own comment. It is a comment that could be heeded to advantage in our own country.

Paris, March 9—Leon Ventou-Duclaux, editor of the commercial vehicle paper *Le Poids Lourd*, secretary to the Technical Laboratory of the Automobile Club of France, engineer, chemist and author of many technical works on motor engineering, died recently, aged 36, as the result of sickness contracted on the French front.

Ventou-Duclaux, who before the war was responsible, with Lieutenant Lumet, for the Technical Laboratory of the Automobile Club of France, held the military value of a private in the artillery. As such he was sent to the Front on the outbreak of war but after a year's service under severe conditions was discharged from the fighting forces, suffering from bronchitis. After recovering somewhat he was given a position for which he was eminently suited in the airplane motor test department of the French army Here he worked with another motor journalist and engineer, Charles Faroux, also serving as a private. While testing motors under very severe weather conditions a few weeks ago, Ventou-Duclaux contracted a chill, which in his weakened condition developed into pneumonia and proved fatal.

The death of Ventou-Duclaux is an example of the weakness of the military system, which continues to give to fully developed men the military value they possessed when youths of twenty. By reason of his comparatively poor physical development, Ventou-Duclaux ranked, according to the military scale of values, as an indifferent artillery private. In civil life he stood at the head of his profession and was a most valuable member of the community. By putting him into the field the army gained little and has lost a man who could have been as useful to its technical service as he was to the automobile industry of France.

Our Motor Resources

AS pointed out on this page two weeks ago, America has vast resources in its millions of motor cars which may, in case of need, be utilized in some way or other for the benefit of the government, chiefly in transportation. However, we are likely to become over-enthusiastic on this score, and assume that, on account of there being mere quantity of vehicles which may be placed at the disposal of the Government, we have a wonderful transport medium.

SUCH, however, is not the case. That these cars potentially are valuable cannot be denied, but we have a tendency to exaggerate that. On this subject also we can turn to England's experience for a lesson. When Great Britain started the war, she had a mixed aggregation of vehicles of all sort, in all conditions of repair and non-repair and of all ages and styles. Her troubles were frequent and woeful. The only excuse for the great amount of labor required to put these used cars into any state of reliability, which would permit of their performing efficient service, was the great emergency that existed then. Hundreds of trucks which had been operating in daily service for private firms were thrown into the junk heap after they had been taken to the place of mobilization. Some of them when worked on every day would run, but to keep such a truck in a column, where a breakdown meant a complete tieup of traffic, for perhaps 5 miles to the rear, rendered their use almost an impossibility.

IT IS fortunate for America that at the present moment there is no urgent need for a vast aggregation of transport facilities. Army heads calculate on having a supply of trucks large enough for the troops that are ready for movement. As fast as the army can be raised, and put in shape for service, new trucks can be produced in quantities sufficient to care for them. The reliance for mobilization of troops on trucks now in commercial service or private motor cars now in the hands of owners is a mistake.

America Now Needs Trained Drivers

Plenty of War Trucks—Few Operators and Few Roads

AMERICA finds itself in the extraordinary condition of being able to supply more trucks than there are drivers to operate them. This was forcibly brought out in a recent address by Joseph E. Husson, editor the Commercial Vehicle, before the editorial conference of the Trade Press Association in New York.

According to Husson, war finds us prepared in motor trucks, unprepared in personnel to operate them and sadly unprepared in roads over which they can be run. There are approximately 250,000 motor trucks of all classes and sizes in use in the United States to-day in all lines and all classes of business. The total present output of motor trucks of all kinds is close to 700 per day, although not all of these are suitable for war service. Six of our truck makers can supply 100 trucks suitable for army needs a day, under present manufacturing conditions, and this output can be almost doubled by them should the necessity arise. Our government already has something over 2000 trucks which it purchased for use with the Mexican expeditionary force. These are all available and most are ready for active service on the moment. Yet only 11.3 per cent of our 2,451,660 miles of roads are surfaced and can possibly be used for truck work every month of the year.

Taking a leaf out of a lesson book of the European nations, it is not the intention of our government to commandeer indiscriminately the trucks of private users, especially those engaged in industrial work, which the experiences of the war abroad have proved of as vital moment to successfully carrying on a campaign as it is to have the army supplied with everything it needs for actual work in the field.

Novices in Preparedness

We are still novices in preparedness work as compared with the nations abroad and we must take the advice of the special commissions which France and Great Britain are sending to our shores. We are the richest nation in the world, with the greatest resources, and yet we are not quite certain how we shall use these to the best advantage. To avoid the mistakes made abroad we must make haste slowly and avail ourselves of the experience of Great Britain, whose position was most nearly like that of our own at the outbreak of the war.

One of these lessons which the War Department has already learned is indicated by its intention not to confiscate civilian motor trucks for war work, but to purchase trucks from the makers and in this manner avoid paralyzing our industrial transportation. Our truck makers stand ready to meet this demand, whatever it may be. Civilian trucks will not be used according to present plans except in cases of necessity in districts local to those in which they are ordinarily engaged.

One of our greatest problems in connection with the motor transportation needs of the army is to obtain competent motor truck drivers. To secure such men from among the ranks of the present-day drivers will tend to paralyze the efficiency of our industrial truck work, which is just the thing which should not be done.

Training Camps for Drivers

To secure competent drivers from among the ranks of the passenger car owners and chauffeurs and to train novices would seem the most likely method, yet even this would require a considerable amount of training. It would be necessary to establish training camps in various parts of the country in which truck driver applicants might be trained first hand in driving trucks over all sorts of roads. The training necessary for a motor truck driver in army service requires considerably more knowledge and experience than that possessed by the average passenger car driver, as shown by the results of our Mexican expeditionary force. These men must be trained to keep their vehicles in convoy formation, to extricate their trucks from mires in bad roads, to perhaps run at night without lights over unknown stretches of roads and perhaps to keep their seats in the cab for 24 hr. at a time.

In suitable roads for military service we are sadly lacking, especially throughout the great Mississippi valley, which is the greatest grain-producing area in the Western Hemisphere. This huge territory is practically barren of usable roads on which trucks could operate 12 months of the year. Should this great agricultural valley be attacked from the south across the Mexican frontier, motor trucks would be positive necessities.

Due to the fact that the railroads do not run up to the guns, it would be imperative to handle the ammunition by motor transportation. The gigantic size of this problem can be realized when on the French front it requires a fleet of 480 trucks to handle enough ammunition to feed the big guns for 2½ hr. In Italy, twenty-four motor trucks are needed continuously to supply ammunition for one large gun. From this it may be seen that practically preparedness means permanent roads, and that while our makers can furnish a sufficient number of trucks and while drivers may be trained to drive them, they will be practically useless unless we have permanent every-day-in-the-year roads over which they can be run.

Enlistment Guide

FOR MECHANICS, TRUCKMASTERS, AVIATORS, MOTOR CAR DRIVERS, ETC.

HEADQUARTERS

Governor's Island, New York

States

New York	District of Columbia
New Jersey	West Virginia
Pennsylvania	Virginia
Delaware	Canal Zone
Maryland	Porto Rica

Boston, Mass.

All New England States

Charleston, S. C.

North Carolina	Tennessee
South Carolina	Mississippi
Georgia	Coast Defenses at
Alabama	New Orleans
Florida	Galveston

Chicago

Ohio	South Dakota
Kentucky	Missouri
Michigan	Iowa
Indiana	Kansas
Illinois	Nebraska
Wisconsin	Wyoming
Minnesota	
North Dakota	Colorado

Fort Sam Houston, Tex.

Texas	Oklahoma
Louisiana	New Mexico
Arkansas	Arizona

San Francisco, Cal.

Washington	California
Oregon	Nevada
Idaho	Utah
Montana	Alaska

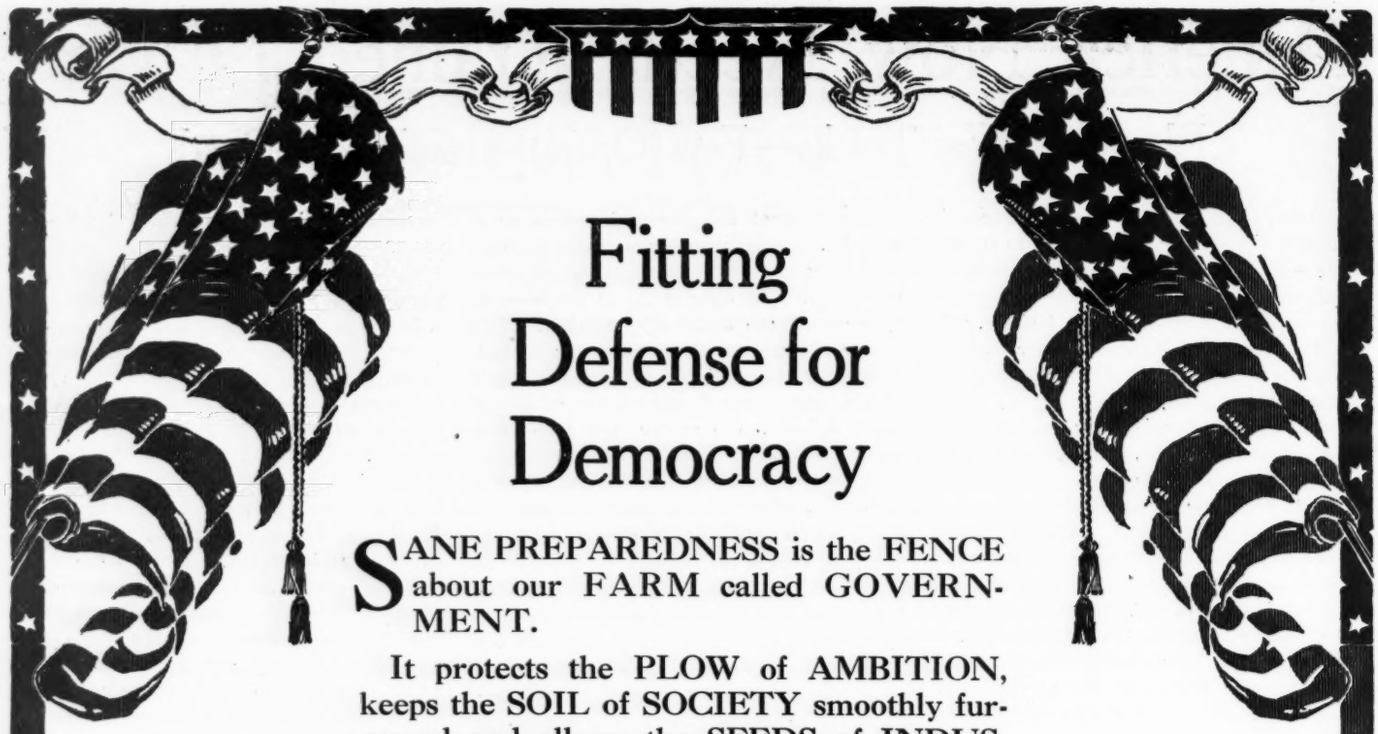
OFFICER ENLISTMENTS

Aviators, airplane designers, engine designers, inspectors, etc., wishing to enlist as officers should apply to the Quartermaster General at Washington, D. C., who will direct them to their respective quartermaster's offices, after passing on their applications. Aviators will be enlisted in the Aviation Section of the Enlisted Reserve Corps in the grade of a corporal or sergeant. Engineers will be enlisted in the Engineers' Corps.

PREDICTS STEAM AIRPLANE

Detroit, April 20—Abner Doble, vice-president of the General Engineering Co., believes that steam as a motive power for airplanes may be used in the near future. The powerplant of the Doble steam car, which is manufactured by the General Engineering Co., develops 1 hp. to 10-lb. weight, which is a better ratio, according to Mr. Doble, than that of a complete powerplant of a gasoline car and when used in an airplane is not encumbered with clutch, change speed transmission and starting apparatus and the ratio of weight to power is greatly reduced.

Mr. Doble is experimenting on his powerplant for aerial purposes in an endeavor to reduce the weight and expects to lighten the boiler and engine by careful adaptation of design and the use of special materials. The electrical apparatus may be eliminated virtually by taking advantage of the draft supplied by the propeller and the velocity of the plane.



Fitting Defense for Democracy

SANE PREPAREDNESS is the FENCE about our FARM called GOVERNMENT.

It protects the PLOW of AMBITION, keeps the SOIL of SOCIETY smoothly furrowed and allows the SEEDS of INDUSTRY, LITERATURE and SCIENCE to GROW undisturbed, fearless of destruction, CERTAIN OF CULTIVATION.

Universal military training is this fence.

THE United States MUST have ample PROTECTION. It must be a protection suited to a DEMOCRATIC NATION—NOT based upon the theories of other countries whose armies are inherited from ancient days.

Our army should be a useful one in times of peace, doing constructive work, FIGHTING to make our country a better one, READY to FIGHT against other countries if need be.

Other nations have armies for the welfare of the rulers. AMERICA MUST HAVE AN ARMY FOR THE WELFARE OF ITS PEOPLE.

Standing armies of vast numbers who live idly and pleasantly while the masses struggle to sustain them are king-supporting institutions.

THAT is the old system of Europe. The United States wants none of it.

This nation does NEED a great army of men who can RESPOND quickly to the call to arms and who WILL BE FAMILIAR with them.

AND IT NEEDS YOUR SUPPORT to obtain it.

YOU MUST help to secure universal military training which is the ONLY DEMOCRATIC PREPAREDNESS.

Universal training is provided for by Congress Senate Bill No. 1695, known as the Chamberlain Bill. It is a bill that will:

Provide training for every able man for six months of his nineteenth year.

Instruct every man how to PROTECT this nation.

Insure the complete disappearance of slackers.

Give to America a vast army READY at ALL TIMES, yet able in time of PEACE to engage in INDUSTRY, ART, SCIENCE and other beneficial pursuits.

Provide against the heavy cost for sustaining a large standing army.

Guarantee the RESPECT of ALL OTHER NATIONS.

Develop the MANHOOD of the American boy.

Produce HEALTHY American citizens.

Instill discipline into the mind of all Americans.

Foster patriotism and love of these United States.

IT WILL DO A THOUSAND PROFITABLE, SUBSTANTIAL, BENEFICIAL THINGS. IT WILL MEAN THE DISAPPEARANCE OF THE EVILS OF THE ANCIENT STANDING ARMY SYSTEM.

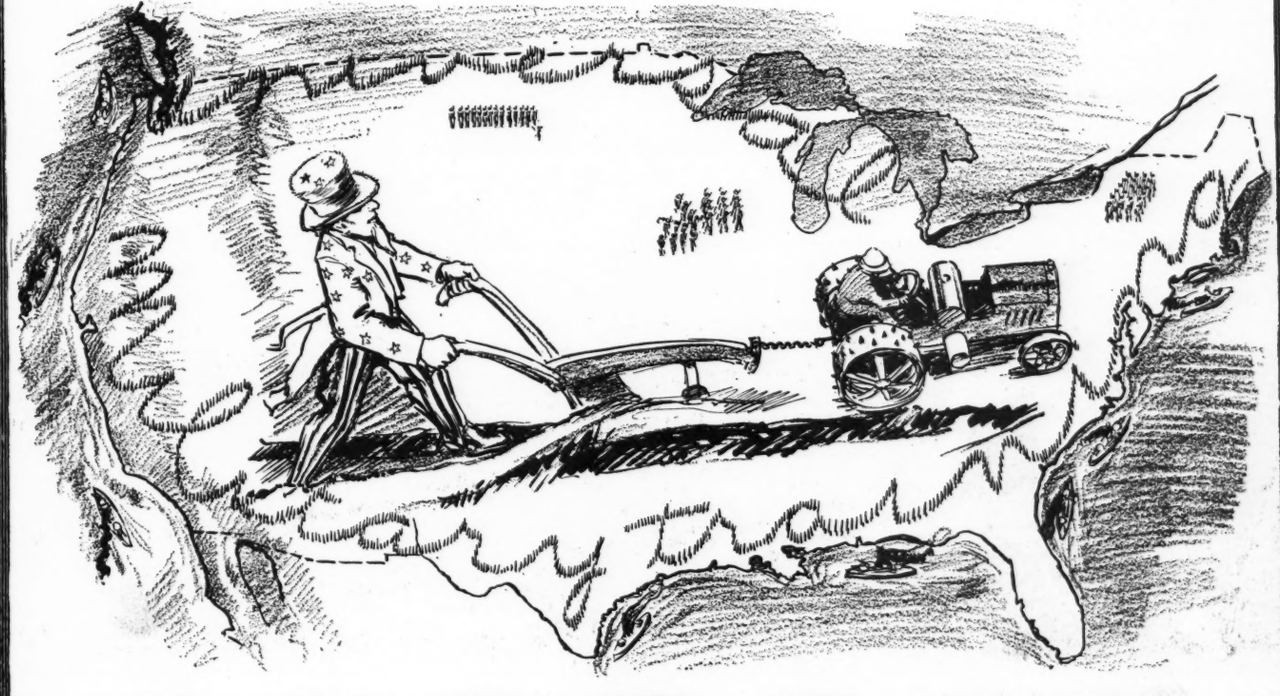
BUT—TO GAIN THE PASSAGE OF THIS BILL—YOU MUST ACT. YOU MUST AWAKEN TO THE IMPERATIVE NEED FOR SPEEDY PREPAREDNESS—TO THE OVERWHELMING DANGERS THAT THREATEN ALL DEFENSELESS NATIONS—TO THE FACT THAT OUR COUNTRY IS NOW—AT THIS VERY MINUTE—TODAY—AT WAR—and that its INSTITUTIONS, IDEALS, PRINCIPLES, CITIZENS and MATERIAL WEALTH are AT STAKE, and DEMAND AN IMPREGNABLE DEFENSE.

AND YOU MUST VOICE YOUR APPROVAL OF THIS BILL FOR UNIVERSAL MILITARY SERVICE EMPHATICALLY BY LETTER OR TELEGRAM TO YOUR SENATOR AND CONGRESSMAN.

We would pity the stupidity of a tiger who, attempting to escape from a gorilla, would jump from a mountain top.

Unless we—and that includes YOU—use SPEED and COMMON SENSE as we face the perilous times that NOW confront us, we may discover that we have jumped from the MOUNTAIN TOP of LIBERTY to the valley of lost ideals, misery and ruin.

We MUST be prepared to defend OUR IDEALS, OUR LIBERTY, OUR PRINCIPLES, OUR CITIZENS—and WE MUST make our DEFENSE as DEMOCRATIC AS OUR NATION.



To Inspect Cars Shown

Chicago Dealers Appoint Committee to Appraise Exhibits Before Displayed

Practically All Space in Coliseum Is Taken

CHICAGO, April 24—That all of the cars to be exhibited for sale at the Great Central Market Used Car Show at the Coliseum May 5-13 will be in good condition is made certain by the appointment of a mechanical inspection and appraisal committee of seven members. This committee includes the service men from twelve of the dealers, assisted by F. E. Edwards, formerly technical representative of the American Automobile Association. All the cars which are to be exhibited must be inspected for their mechanical condition and appraised by this committee before they are permitted to be displayed.

Practically all the available space in the Coliseum has been taken up, and there are twenty-five small spaces which have been allotted to accessory concerns.

Members of the Chicago Automobile Trade Association, which is staging the show, are much encouraged by the reports of the success of the Milwaukee Used Car Show and believe that the Sunday sessions will be particularly profitable. Arrangements have been made for three periods during which cars which have been sold may be removed and replaced by others.

PRODUCING FORTY CARS DAILY

Pontiac, Mich., April 23—The Olympian Motors Co. is installed in its new factory and is now maintaining a schedule of forty cars per day.

CLOSER INSURANCE CO-OPERATION

Chicago, April 23—Motor car dealers and insurance companies have a plan of co-operation in force which is expected to be mutually beneficial. The insurance companies have held that some dealers have padded bills to them for parts and labor, while the dealers have held that some insurance adjusters have taken business to irresponsible repair men that rightfully belonged to the dealers because the irresponsible repair man offered the adjuster a commission. A committee of insurance men and a committee of the Chicago Automobile Trade Association recently met, and adjusted all differences, and in the future all grievances will be handled by these committees.

FAGEOL IN START TEST

Oakland, Cal., April 23—A speed of 25 m.p.h. from a standing start to a full stop in 40 ft. was the record attempted by the Fageol car in Oakland, Cal., recently. The test was made in the ball room of the Oakland hotel on a runway 75 ft. long. Claud Fageol and five passengers were in the car.

DISBROW IN FACTORY

Cleveland, Ohio, April 23—The Disbrow Motors Corp. has moved to its new factory in this city and will engage in the production of the Disbrow semi-racing sport cars on a larger scale. The production schedule for this year calls for 2500 cars.

SOUTHERN TIRE FACTORY

Dallas, Texas, April 23—The Southwestern Tire and Rubber Mfg. Co. will establish a plant in this city to cost $80,000. The company is capitalized at $250,000. Officers are R. L. Cameron, president; W. W. Taxis and L. G. Murray, vice-presidents; W. E. Suttles, secretary, and J. G. Gillespie, treasurer.

PREPAREDNESS IN MICHIGAN

Lansing, Mich., April 20—The Secretary of state of Michigan's census shows 91,077 men working in motor vehicle factories; 47,349 in motor parts factories; 5709 in gasoline engine plants; 30,526 in castings and drop frogings; 1901 in brass manufacturing; 27,927 in machinery and accessories work.

Used Car Show Success

Milwaukee Sells Fifty-four First Three Days and Extends Exhibition

More Than 2000 Are Visitors on Opening Day

MILWAUKEE, Wis., April 23—So successful has the first annual Used Car Congress, which opened here Friday under the auspices of the Milwaukee Automobile Dealers' Association, been that it has been extended three days and will remain open until Thursday. Yesterday at 2 p.m. fifty-four cars had been sold. The Kisselkar held the record then with sixteen sales.

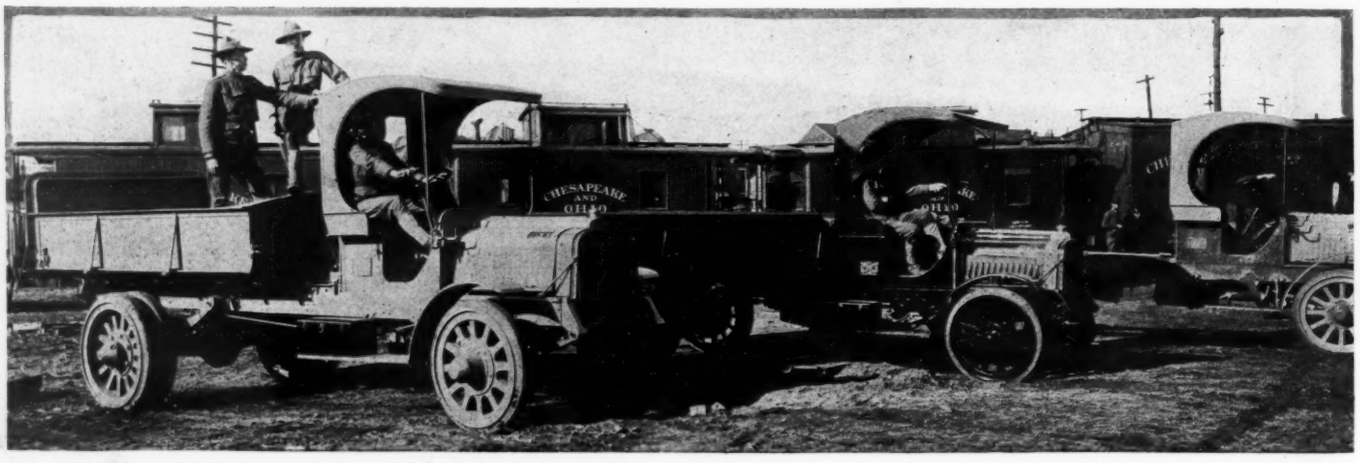
Eighteen Milwaukee dealers out of the forty-five members of the association are exhibiting their used car stocks at the show. There might have been more. The reason there is not more involves the show itself. Originally twenty-three dealers had space, but the preliminary advertisement of the display caused such a stimulation of the demand for used cars that five dealers found themselves without any second-hand cars to speak of and thus were obliged to relinquish their space.

More than 2000 persons visited the show the first day. From the formal opening at 1 o'clock Friday afternoon until closing time, 10:30, there was a constant stream of visitors, most of whom appeared to be vitally interested in used cars. Actual sales on the first day numbered twenty-one, and not one sale for less than $500.

The highest-priced car at the show is a Packard Twin Six, Model 2, 35, which is held at $1,800. A 1916 Winton big six ranks second in price at $1,750.

ACCESSORY MAKERS MEET

Chicago, April 19—Thirty members of the Chicago motor car accessory makers, who are in the habit of meeting every two weeks to discuss matters of mutual interest, at last night's meeting expressed a



This shows the precautions being taken by the United States Motor Truck Co. Everyone entering the railroad yards must show a pass to the military authorities shown

strong feeling that they as associate members of the National Automobile Jobbers' Association should be placed in the regular membership classification of the association and thereby enjoy equal privileges with the jobbers who comprise the membership of the association. The matter will unquestionably be one for consideration at the convention to be held at Virginia Hot Springs, June 4, 5 and 6. The accessory makers also are interested in adding to the association's list of jobbers several names that are not at present on the list but which the makers feel should be on it.

The Chicago and Milwaukee accessory makers are arranging for special cars leaving for Virginia Hot Springs on Friday and Saturday, June 1 and 2.

SHAW BUYS JORDAN TAXIS

Chicago, April 23—The Walden W. Shaw Co., Chicago, one of the largest taxicab and motor livery companies in the United States, recently has added the Jordan motor car to the 1200 and 1500 cars it already has in service. The sale of ten seven-passenger Jordan touring cars to the Shaw company was made by the Chicago Motor Co., Inc., Jordan distributor in Chicago.

TRUCK OUTPUT LARGER

Detroit, April 21—The Packard Motor Car Co. is preparing to increase its truck output from 600 trucks to 1000 trucks a month. The company will resume foreign shipments as soon as the Government requests that such aid be given the Allies. The company has made no foreign shipments since Dec. 15, 1916. Domestic business has gone forward rapidly and passed the $3,000,000 mark in March.

Electric Makers Meet

Agitation for Growth Cumulates in Plan to Combine Interests in Industry

Anderson Manager Sees Rich Field in South

NEW YORK, April 19— The electric vehicle industry wants a larger place in business. The personnel of the industry has been wanting this larger place for several years, and, as one of them expresses it, they have been "talking and doing nothing" all this time in an effort to find out how the combined electric interest of the whole country can combine and put the electric—pleasure, commercial and industrial—in this larger place.

Several years of agitation terminated this afternoon in a meeting of manufacturers at the headquarters of the Electric Vehicle Division of the National Electric Light Association, and before the session ended a plan, which is something long desired, was formulated.

This plan proposes that there be chosen a chief officer for the work and that up to him be put the task of pushing the job through. He is to have—if the plan is adopted generally—the support of the car and truck makers, the battery makers, the tire makers, the central stations and all other divisions of the electric industry. The work will be financed by contributions from various manufacturers, and probably $20,000 will be spent the first year.

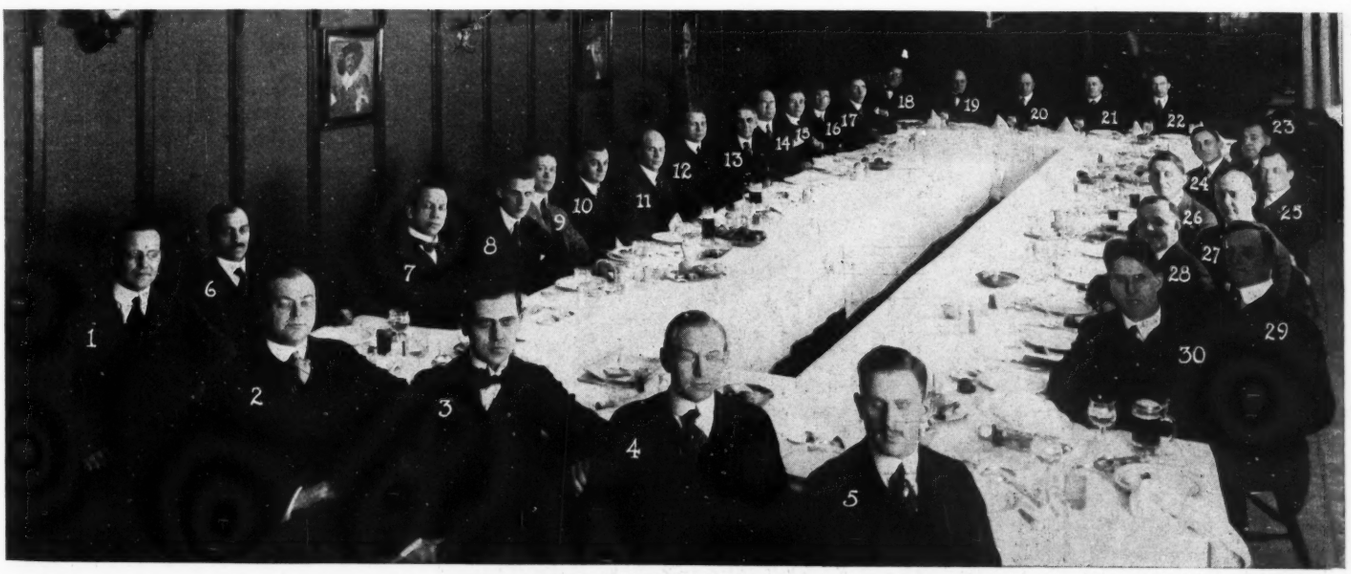
Those at to-day's meeting seemed confident that if all friction is eliminated, full co-operation secured and real effort put forth the electric vehicle industry can be shoved ahead wonderfully in a comparatively short time.

One of the biggest handicaps in getting a plan into operation has been a lack of co-operation. The car makers have cried for help from the central stations, the central stations have said they are being asked too much, someone else has said there is too much seeking for individual advancement by men and companies, and so the condition has grown until co-operation is one of the biggest needs.

New York, April 20—That the South contains one of the greatest opportunities for the electric car is the belief of E. P. Chalfant, manager of the eastern division of the Anderson Electric Car Co. Mr. Chalfant has just completed a long business trip through the southern states and gives as reasons for his belief that the electric is suited to the South and the South likes the electric the following:

"In the South," he says, "most cities have their streets well paved and the country roads are sandy or slippery clay, so that little touring of any kind is done outside a radius of 25 miles from the cities. Cities which fit this description are: Richmond, Norfolk, Winston-Salem, Charlotte, Columbia, Charleston, Savannah, Atlanta, Macon, Jacksonville, Tampa, Mobile, Birmingham, Montgomery, New Orleans, Meridian, Nashville, Chattanooga, Knoxville and Memphis.

"The population inside the city limits of these cities is 1,594,583. If cars were sold at the rate of only one to 500 people



CHICAGO MOTOR CAR ACCESSORY MAKERS' CHICAGO DINNER

1—Franklin Mayo, Mayo-Skinner Mfg. Co.; 2—N. H. Oliver, Metal Specialty Mfg. Co.; 3—Paul G. Niehoff, Chairman, Paul G. Niehoff Co.; 4—E. V. Swanstrom, Findeisen & Kropf Mfg. Co.; 5—Conrad Niehoff; 6—L. W. Golder, Metal Specialty Mfg. Co.; 7—Noah Van Cleef, Van Cleef Bros.; 8—G. W. Day, Atlas Auto Supply Co.; 9—Paul Victor; 10—Paul Parziek; 11—F. S. Armstrong, Vesta Accumulator Co.; 12—F. J. Rodloff; 13—H. E. Patterson, Warner-Lenz Co.; 14—W. C. Jones, American Ever-Ready Works; 15—J. R. Brookings; 16—C. J. Woolheim; 17—G. E. Discher, Gemco Mfg. Co.; 18—J. H. Wiedenhoff; 19—O. W. Brown; 20—A. Nelson; 21—E. H. Younglove; 22—O. F. Stuefer; 23—B. J. Koral; 24—O. O. Dennis; 25—H. P. Collins; 26—C. E. Young; 27—A. H. Framheim; 28—C. O. Ferguson, Advance Felt Specialty & Cutting Co.; 29—J. E. Duffield, Bailey differential; 30—David Beecroft, Motor Age.

it would mean the sale of 3189 cars. And where the cars sell repeat orders come easily in this section.

"It may be surprising to many to know that the nearer the equator you go the more inclosed cars are used. They are a hot-climate car as well as a winter car. A heavy roof, heavier than a canvas top, is necessary to keep out the intense heat of the sun. And along the coast a sea breeze comes up at 4 o'clock and it is chilly driving during the evening. Also, heavy and chilling fogs often come down at night and an inclosed car is almost necessary for real comfort.

"There will have to be more dealers and better electric facilities before sales can go very far. In most of the cities I visited there are generally not more than three dealers in electrics and often only one. We have placed an agency in Havana. In all of these cities conditions are ripe for the invasion of the electric with the exception of central station arrangements. We must arrange with the central stations for improved arrangements and then sales will follow easily if pushed."

DE PALMA TO RACE PACKARD

New York, April 20—Ralph de Palma has bought the Packard racer which has been used during the last year in testing the company's new airplane engine and has shipped it to Sheepshead Bay to prepare for the May 19 race there. It is said that de Palma is also in the market for another car and may select one of those to be disposed of by the Indianapolis authorities. This probably will mean the retirement of his Mercedes.

Prest-O-Lite Co. Is Sued

Commercial Acetylene Co. Asks Injunction and Damages From Licensee

Failure to Pay Royalties Since Searchlight Decision Alleged

NEW YORK, April 23—The Commercial Acetylene Co., owner of the patent under which the Prest-O-Lite Co. is licensed to store acetylene by the acetone process, has brought suit against the Prest-O-Lite Co. The Commercial Acetylene Co. claims that the Prest-O-Lite concern has refused to pay royalties since the Searchlight decision in which the patent was held to have expired because of the expiration of a prior British patent covering the process. The latter consists in employing tanks containing acetone and an absorbent substance in which acetylene is stored under pressure, the great feature of the invention being that it safeguards the gas from explosion and the tanks are both safe and convenient to handle.

The Searchlight decision was reversed by the circuit court of appeals, which reversal was sustained by the United States Supreme Court in 1915 and the Commercial Acetylene Co. thus declared that the patent has not expired. An injunction and damages are asked.

The patent involved in the suit is No. 664,383, granted to George Marie Auguste Claude and George Albert Hess Dec. 25, 1900, who assigned it to Bruno Adbank Abakanowitz of Parc St. Maur, France, assignor to the Commercial Acetylene Co. On March 8. 1905, this concern granted a license covering use of the invention on motor cars, carriages and other road vehicles to the Concentrated Acetylene Co., predecessor of the Prest-O-Lite Co.

Before equipment of cars with electric starting and lighting systems became common acetylene tanks were used practically entirely for these purposes, and there are still many thousands of cars and trucks in use which employ these tanks.

FIAT SUES SIX MAKERS

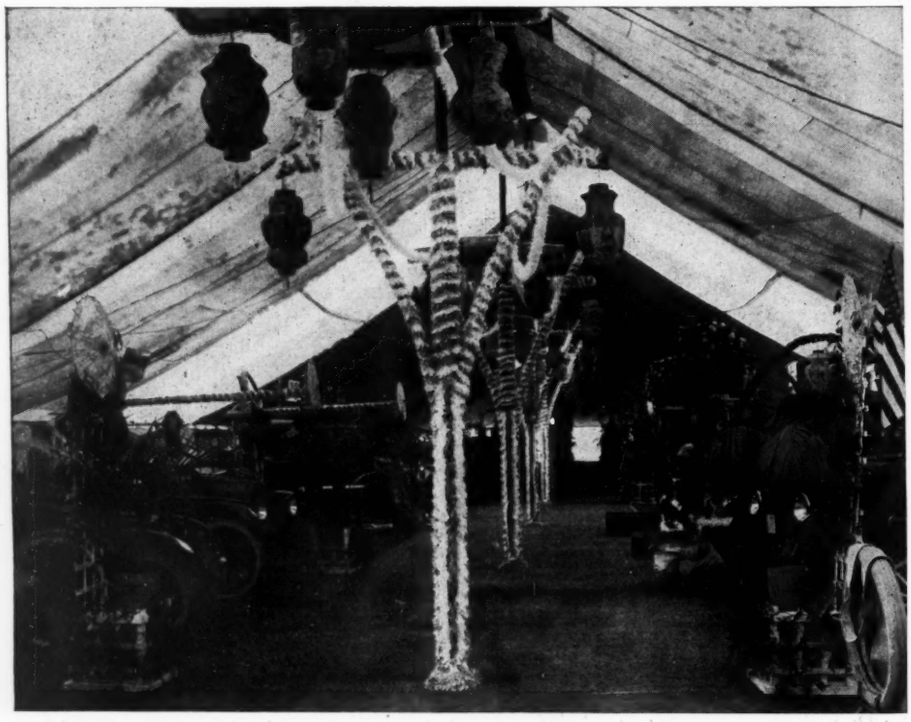
New York, April 23—The Fiat company has brought six suits against motor car and truck manufacturers, charging infringement of patent No. 1,190,252 covering the construction of cored intake manifold. The suits are against the Saxon Motor Car Corp. and the Saxon Motor Car Co. of New York; Moon Motor Car Co. of New York; Hupp Motor Car Corp., Hupmobile Co. of New York and Charles E. Reiss & Co.; Paige-Detroit Co. of New York, Inc.; Burford & Co., Ltd.; and the Garland Automobile Co. Injunctions and damages are asked.

The construction outlined in the patents involved in the suit has become used very widely with the increasing trend toward block cylinder casting. The patent was issued to Fiat Co. as assignee of Guido Fornaca, Turin, Italy, July 4, 1916, on an application filed Dec. 17, 1909. Suits are in the U. S. District Court for the Southern district of New York.

71.7 MILES IN 24 HRS.

Detroit, April 20 — The five-passenger stock Chalmers car completed its 24-hr. demonstration test yesterday, during which time it traveled 71.7 miles. The object was to show the minimum number of miles traveled in 24 hrs. to illustrate the ability of the car to throttle down at low speed on high gear. The car was sealed in high gear and the standard gear ratio of 4¾ to 1 was used. During the 24 hrs. the car stopped four times, two of these due to traffic, one by police and to engine stalling on an incline. Other interesting points follow:

Water used, 2½ pt.
Battery reading before, 1280.
Battery reading after, 1150.
Lamps used and for how long: Tail light and dimmers, 6 hrs.; headlights, none; dashlight, only while reading speedometer.
Blew horn five times.
Tire inflation 70 lb. in rear, 62 lb. in front.
United States Royal Cords, 32 by 4.
Position of choke lever, lean all the way.
Weight of car loaded, 3400 lb.
Weight of car empty, 2700 lb.
No knock in clutch.
Number of stops of car, four: Two of these traffic stops, stopped once by police who suggested that in driving rain headlights instead of dimmers only be used.
Two engine stops due to stalled engine on an encline.
Average speed, 2.9875 m.p.h.
Highest sped, 5 m.p.h. made necessary to avoid traffic.
Gas consumption, 7 gal. 1 pt.
Oil consumption, nil.
Gas mileage, 10.06 miles to gallon.
Gear ratio, 4¾ to 1.
Distance covered, 71.7.
Acceleration, 5 to 25 miles 12 sec.



This is an illustration from the Iowa City tent show, which was held April 18-21

A peaceful-looking scene, but not so peaceful when you know that the Ford car in the picture is on a mountain pass that is within rifle range of the enemy's trenches

How Motors Serve the Army

Italy's Trucks and Cars Are Examples

By W. F. Bradley

In Two Parts—Part II

EDITOR'S NOTE—W. F. Bradley, special Motor Age representative in Europe, was for four months, ending with Jan. 12, engaged in the Italian Ambulance Service on the Italian-Austrian front. While doing regular ambulance duty he had the best of opportunities to study the use of cars and trucks on this, the most difficult front of the European war. In this story he deals with the mechanical features that have proved best in the conditions motor transportation meets in the mountains. The pictures reproduced herewith were taken specially for Motor Age and have been approved by the Italian censor.

TRENCH mortars, aerial torpedoes, rifle ammunition and food for the troops in the trenches are all carried up by a combination system or motor and horse or mule traffic. The bulk of this ammunition will be taken to stores as far forward as possible, and in nearly every case ahead of the artillery, from which it will be moved up under darkness by pack mules or light carts. The final distribution to the men in the trenches cannot be undertaken economically by motors, for not only are there no roads, but the country may be under rifle fire and supplies should be distributed as much as possible to avoid loss.

Mountainous country makes impossible the employment of huge masses of troops, such as are engaged commonly on various parts of the French front. Also, it makes railroads impossible and gives additional importance to roads and road transport. The height at which artillery can operate depends almost entirely on the nature of the roads, for while a mule can climb up a mountain side with rifle and machine gun ammunition, it is difficult if not impossible to get material to the big guns if the mountain roads are not fit for motor car traffic. Up to 4000 ft. a very vigorous artillery warfare can be waged, for at these heights the roads can be kept clear of snow during nearly all the winter, and motor trucks can take up a supply of ammunition direct to the guns. Above this height warfare is practically at a standstill except for two or three months of the year, owing to the absence of roads and the consequent transport difficulties encountered.

Contrary to what may be expected at first sight, the greatest motor vehicle difficulties are not encountered on the high peaks but on the lower heights, such as the Middle Isonzo district and the Carso. The main roads on the higher passes are wonderful examples of engineering, and though convoys may have to climb steadily for 6, 10, 12 or more miles, it is not often that the gradient gets above 7 per cent, while a 12 per cent gradient is almost an excep-

tion. The main roads on the higher passes are all macadam surfaced, scientifically drained, and as the traffic is never heavy, they can be keep in good condition. Nevertheless, an abrupt climb from sea level to 4000 ft., practically all on the lower gears and with full load aboard, is a much more strenuous test than a few hundred yards on a freak hill. The descent is almost as strenuous, for brakes have to be used constantly, and hairpin bends on sharp gradients call for an efficient lock and skilled handling.

On the lower heights—from 600 to 2000 ft. above sea level—masses of troops can be operated, and road traffic naturally increases in intensity. In some of this wild hilly country, with gradients varying from 5 to 10 per cent, there is as much vehicular traffic as will be found any day on upper Broadway, New York. Cut out of the face of the hill it is difficult to make these roads, except at a great expenditure of time and labor, and as they are always under shell fire they cannot be kept in good repair. Holes can be filled up and stones can be scattered, but to properly macadamize them is out of the question. It is with such a combination—roads just wide enough for two vehicles, with an abrupt wall on one side and a clear drop on the other, a rough surface several miles deep in mud, frequent shell holes and intense traffic that the greatest strain is put on the motor trucks service.

Roads Under Shell Fire

To give a specific instance, there is on the Lower Isonzo front, a route 10 miles long uniting two important points and carrying very heavy traffic both day and night. The maximum gradient is 8 per cent, and for a distance of 5 miles it never drops below 4 per cent. The entire road is under shell fire and in consequence only roughly repaired by hand labor—it is never steam rolled. During wet weather there may be 6 in. of mud on the road; from time to time as shells fall, there are holes of much greater depth, but they are rapidly filled up by throwing in whatever material is available. Under winter conditions this road presents the maximum of difficulties truck convoys can encounter and maintain a regular service. That is to say, if conditions were any worse convoys would not get across regularly, although isolated vehicles cleverly handled would undoubtedly make the trip. Convoys of 1-ton Buicks, with their normal load and handled by experienced men, can just make this trip, but a considerable amount of low gear has to be used and generally the radiator needs replenishing at the end of the run.

Trucks on Alpine Roads

The statement that the most strenuous conditions are not encountered on the highest mountain roads may come as a surprise to persons unacquainted with European roads. It must be remembered, however, that the higher the mountains the less the traffic and also that these roads are

A month-old battlefield has this good road. Material from wrecked buildings was used for it

beautiful examples of engineering and have for years been kept in perfect condition. On the higher passes there is but a small use of infantry, everything depending on the artillery. Gasoline tractors generally are employed to haul the guns into their positions, but it is very often possible, and indeed most economical, to send supplies of ammunition up by an aerial cable. This is more rapid and less costly than road transport; it leaves the highways free for other traffic and of course lengthens their life.

These Alpine roads are narrow of necessity, both cost and natural difficulties operating against anything wider than is necessary for two vehicles abreast. Passing is a very difficult matter on the numerous bends. On this account traffic control plays a most important part. Because of the greater danger the volume of traffic which can be carried is very much lower than on the roads of equal width in the planes. It is most important, too, that these roads should not be overcrowded, for a single disabled vehicle on a bend can hold up all traffic in both directions. The urgent necessity of keeping animal and mechanical traction separated as much as possible is obvious in these mountain districts. It is rare for a motor truck to refuse suddenly to take a certain gradient but when this does happen the driver has warning that his engine is failing and can either pull in to one side or run back so as not to interfere with the free passage way.

It is a very frequent occurrence for horse and mule teams to be unable to climb gradients which motor trucks will take with ease. When a horse team balks on a hill, the animals always get more or less out of control, and unless skillfully handled the teams will run backward, sometimes going over the edge of the road, maybe a drop of several hundred feet.

Small Staff Cars Used

One of the peculiarities of the staff car work on the Italian front is the comparatively small size of the engines employed. One of the biggest cars used for this service is the 20-30 hp. Lancia, which has a four-cylinder engine 3.9 by 5.1 in. bore and stroke. Fiat has also in use many staff cars of the same rated horsepower and cylinder bore but with a 5.5 inch stroke. There are, however, in general service, many five-passenger staff cars with four-cylinder engines of only 3.1 by 5.5 in.

Gorizia, the captured Austrian city, one of the extreme points of the difficult Italian front. An old castle tops the hill in the distance

A battery of 305-mm. guns in action. Trucks supply these voracious weapons with their food

bore and stroke, as well as 12 hp. Fiats of only 2.7 by 4.7 in. bore and stroke. These small cars seem to do their work remarkably well both on the rough, heavy roads of the lower Alps and on the higher mountains.

Six-cylinder engines are rare, while eights and twelves are altogether unknown in Italian service. Practically all these cars have a tread of 55 in. and a wheelbase of 110 but not often exceeding 118 in. Undoubtedly these medium-size cars are more advantageous on narrow and crowded mountain roads than larger models, for they get through traffic easily and enable a higher average speed to be maintained than would be possible with a bigger machine. Italian officers, too, appear to be less inclined to ostentation in the matter of cars than is the case among some of their allies. Despite the extremes of climate, open touring cars are in a great majority. Several cases of generals of divisions could be mentioned who are quite satisfied with a 15-20 hp. Fiat touring car for all the year 'round work. High officers, too, will not disdain the modest and economical motorcycle and sidecar. It is not at all uncommon to meet majors and colonels travelling about in a sidecar of Italian, English or American make.

Bus Service for Officers

It is obvious that very close attention has been given to the problem of running the staff car service as economically as is consistent with efficiency. One example of this is to be found in the comparatively small number of luxurious closed bodies. There is another example in the establishment of motorbus service for officers at the front. It would be possible to mention half a dozen important military positions at the front with no railroad within 10 miles, which have a regular motorbus service for officers. The buses, which are usually 25 hp. Fiats, with closed bodies carrying eighteen passengers, make round trips—going to the front by one route and back by another—and work to a regular time table. Their objective is usually some point only 2 miles behind the trenches and, of course, liable to shell fire. This, however, does not prevent a wonderfully regular service being maintained. Officers are carried back to some important railroad depot or can descend en route and continue their journey, if necessary, by train. This system is very effective and avoids a reckless and indiscriminate use of touring cars for taking officers to and from the front. War experience on all fronts has shown that there is always danger of motor car extravagance among officers who will do everything possible to get the private use of a car or, having a car, will employ it where more economical means of transport are available. This objection, however, cannot be levied against the Italian army.

In the wake of the battle come the truck and the new road

Open-Air Army Garages

Truck services for the various Italian armies in the field are divided into parks, each one comprising as far as possible vehicles of a similar type and make, garaged in the majority of cases in some big open space. Many of these big parks, comprising probably 200 trucks, are without any cover whatever, all work being done in the open. Each park has attached to it a motor car workshop with power-driven lathe, drilling machine, grinder etc. Although not usually under shell fire these parks must be kept as near to the front as possible and must be capable of moving at very short notice, according to military operations. It is on this account that it is a difficult matter to erect even temporary shelters. The best that can be done usually is to put the motor truck repair shop by some building which can be used as a garage and extend the roof to cover it, thus making it possible to do the more delicate work with reasonable protection from the elements.

There are separate and entirely independent parks for the tractors used in the haulage of heavy artillery, and as these are required to move their positions less frequently, corrugated iron roofs are erected to give protection to each vehicle, but the facilities for repairs are not usually any better than those for the ordinary trucks.

20 Miles a Convenient Distance

The first really important permanent repair shops are to be found at various points about 20 miles to the rear of the firing line. This is a very convenient distance to meet all requirements, for it is obvious that only a fraction of the motor vehicles are maintained immediately behind the trenches. No work is too important for these permanent repair shops, for they are established as far as possible in some factory and are provided with power and all necessary machinery. All general repairs which are beyond the scope of the traveling workshops are sent here to be treated. At these depots, too, supplies are maintained for all vehicles in service, and arrangements are made whereby spare parts can be sent out to the units in service as required. Although employing military labor only, there is no essential difference between the management of these repair shops and that of civilian establishments doing the same class of work. A close control is kept of

The drivers and their 1½- and 2½-ton Fiat trucks are awaiting the order to move forward to a front line position

all work done, the costs being debited to the particular section for which it was executed, so that it is always known what amount has been spent for repairs and renewals for any particular convoy or any particular vehicle.

Distribution of Tires

Pneumatic tires are distributed from central stores, sometimes connected with the repair depots to the various sections in the field but not to individual cars. These sections keep a small reserve at their headquarters, the officer in charge distributing them to the individual drivers as required. All used tires and tubes have to be returned to the depot, and at certain intervals the tires issued must balance the returns, plus the reserve stock carried. It is impossible to control the use of tires at the front as carefully as is done by taxicab and transport companies, for instance. Nevertheless, some control is possible, for the officer in charge of the section must keep an approximation of distance covered, and the exact number of tires issued being known, an average mileage is obtained. No attempt is made to repair tires and send them back for use on front line service, though it is quite possible that repaired tires are issued to convoys working farther in the rear. The different sections make use of tire gaiters and repair their own inner tubes, but they are not fitted for repairs to casings.

It is rather difficult to get an accurate estimate of the life of tires, but from acquaintance with several sections using 1 and 1½-ton pneumatic-tired trucks, the life would be fixed at not more than 3000 miles. This estimate is for vehicles working close to the front, where roads are made and repaired by dumping rough material, leaving it to the vehicles to roll that material in, and covers tires used to the limits by liners.

Standardization of tire sizes naturally has followed the number of types of cars, although there does not apear to have been any serious attempt to make different manufacturers conform to a common standard. The sizes most commonly employed are 880 by 120, 34 by 4.7 in., and 820 by 120, 32 by 4.7 in. The former size is employed for all the pneumatic-tired trucks, and the latter for the bigger touring cars. There are two other sizes used for the smaller touring cars. The number of sizes employed remains high by reason of the presence of many converted touring cars employed on ambulance service. The bulk of the work, however, is done on three sizes of tires, and it would not be a difficult matter to limit the entire army to these three sizes. Practically all the pneumatic tires are of Italian origin, being made by Pirelli or Michelin. American pneumatics are rare, though American solid tires are a common feature on trucks.

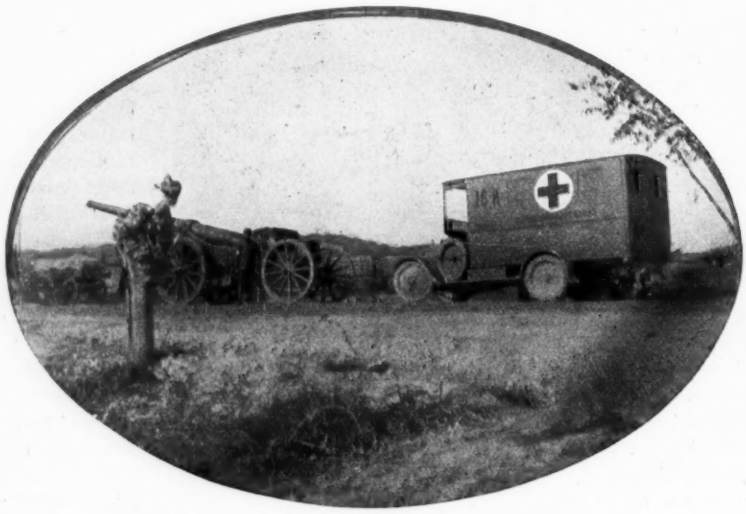
With thousands of motor cars in service, it might be thought that full advantage would be taken of bulk storage of gasoline. This, however, is difficult on any front and almost impossible among the Italian forces. At various points to the rear, where motor trucks are employed in aiding to build permanent defences or where convoys carry goods or ammunition from the factories to the railroad depot, permanent gasoline storage tanks can be installed and tank wagons can be used to advantage. But in the zone of active operations the necessity for mobility makes these permanent installations impossible and leaves the old fashioned tin or galvanized iron can in possession.

One motor ambulance section, for instance, changed its quarters eight times in seven days during the fighting of last August, and each time new quarters were taken up it was never known whether they would be occupied for days or hours. Doubtless the same changes were imposed on other sections, thus making it impossible to have more than the most meager permanent fittings. All gasoline, which, incidentally, is of American origin, is sent to the front in metal-drums of 11 or 5½-gal. capacity. The smaller size is much more convenient for general handling and can be emptied into tanks with less waste.

Motor Mail to Army

Admittedly the system is not ideal, for it calls for many thousands of cans, all of which are subject to rough handling, are apt to leak and are often destroyed. The mere cost of making these cans, filling them, sealing them and keeping them in repair must be a very important item where several thousand cars are in service. It is difficult, however, to devise a more satisfactory scheme for those motor cars always on the move or liable at any moment to change their quarters. It is this fear of finding quarters removed and discovering that supplies have not been brought up which causes every driver to desire to carry as big a reserve as possible. In the big permanent garages at the rear Bowser tanks with self-measuring instruments are fitted and a record kept of all fuel supplied.

Conditions rarely make it possible for any one service to be exclusively motor. Yet there are certain supplies which are 95 per cent motor hauled. One of these is the postal service in the zone of operations. Where the train service stops, in many cases as much as 20 miles back of the actual firing line, the mails are picked up by car and carried to the headquarters of the various divisions in the field. For this work light 12 hp. cars, with a small body not overhanging the frame members, are made use of. By reason of their low weight, absence of



Ambulance and big gun on the way to the front. Both are typical of modern warfare

overhang and correct distribution of weight, these little postal cars can take advantage of every gap in the traffic and maintain a higher average speed on the crowded roads to the front than is possible with motor cars of much greater power and size. The final distribution to the battalions, companies or batteries in the field is made by hand, but so rapid is the motor car service that the final distribution in the trenches often takes place only a few hours after the arrival at the railroad postoffice.

Water is also 95 per cent motor hauled. On the Carso position a wild, barren, sun-scorched plateau with practically no vegetation, not a drop of water is to be found. Also at many other portions of the front the local water supply is not only scarce but of such a doubtful character that troops are forbidden to touch it. Thus the great majority of troops in the zone of operations are dependent on outside supplies of water. It is brought from town supplies in the rear by motor tank wagons having a carrying capacity of 800 gal. These wagons have a power-driven pump, enabling them to discharge into receptacles which cannot be filled by gravity flow.

Huge wood barrels of the type commonly employed for beer and wine are placed at suitable points, such as reserve camps just behind the lines, in the vicinity of batteries, among the wrecked cottages in which troops are billeted and also very frequently in summer time by the side of roads over which large bodies of troops have to pass. These tanks are clearly marked "drinking water" and are much appreciated by the troops. From these barrels there is a final distribution, which may take many forms, right to the troops in the firing line. Sometimes this final distribution is by a small, light, two-wheeled mule wagon containing 15 to 20 gal.; sometimes it is carried in a metal vessel slung on a pole and handled by two men; frequently in the mountain districts the water is carried in leather bags on the backs of mules. Until this matter was given close attention and a systematic service organized whereby motor cars could be relied on to take to the front all the water required for drinking purposes, there was a considerable amount of disease traceable to the drinking of contaminated water.

Whether the food supply is hauled over the rail or the road depends entirely on conditions and location. Where the railroad exists and can be relied on for a regular service, storehouses are established near the depot. These stores are very roughly built sheds, often erected in an open field, within which can be found everything from quarters of beef to cigarettes. Each shed deals in one commodity, and the men who are told off to draw rations arrive with all kinds of vehicles from motor trucks to mule carts and present their order sheets, signed by the rationing officer, at each shed in turn.

Hauling a 305-mm. gun along a rough mountain road. In the distance a truck is approaching

Deliver Rations by Motor

Nearer the lines, where no trains can penetrate, the supplies are taken up by motor cars and trucks and placed in some wrecked building which has been roughly transformed into a store. The officers and men in charge of these stores distribute to the companies on presentation of an order form, as in the case of the bigger stores at the rear.

A rather familiar sight on the roads leading to the front is motor trucks bearing the words "Unione Militare, Service to the Trenches." In Italy, as on all other fronts, officers and men are anxious to supplement their rations by extras not figuring on the government list. In many cases, even when not actually in the trenches, it is impossible to spend a cent for the simple reason that there are no stores and no goods. In the zone a little farther to the rear stores are rare, and owners take advantage of the monopoly to raise prices to unreasonable limits. The Italians therefore have established official co-operative stores and opened branches in all the zones occupied by the troops. The "Service to the Trenches" does not imply that the goods are taken directly to the men sitting behind rifles in the firing line, but they are delivered at various stores established in wrecked villages immediately to the rear of the lines. Thus, while they are actually in the trenches officers and men have brought to them extras which may comprise anything from fresh fruit to fancy wines. Some of the stores carry drygoods and will deliver a variety of goods varying from sewing cotton to trench boots, at prices which are fixed by decree and are generally no more than would be paid for the same goods outside the war zone.

A badly shelled public square in the captured city of Gorizia. The fountain apparently was unharmed

Motor Drivers' Life

With regard to sleeping accommodation and food, men in the motor service never experience the extremes of comfort or discomfort which fall to the lot of men in some other branches of the service. It is rarely that they are sufficiently stationary to be able to requisition mattresses or bedsteads. On the other hand they never have to sleep on the ground, for any kind of motor vehicle, whether it be a touring car or a truck, can be

made into a dry, if not a warm, bedroom. Meals may not arrive with the same regularity as to the men in the heavy artillery and other semi-stationary services but the motor driver, being unlimited in his carrying capacity, need not go hungry if the ordinary supply fails, as is often the case with the men in the trenches.

Motor drivers endeavor, as far as possible to get some building, or at any rate some wreckage of a building, which they can regard as home. There is remembrance, for instance, of men attached to motor searchlights, which every evening were taken up to positions among their own trenches to flash a light across the enemy's lines. They had to live near their "work," and the best location was discovered in a wrecked farm which had reserve trenches under and around it and barbed wire in its disreputable courtyard. Those windows looking on to the enemy's lines were boarded up one night, so that no man would be tempted to look out and thus attract the attention of the guns. Two rooms were found to be fairly dry and were equipped with bedsteads made of trestles with wire netting spread across them. When hay is thrown across this, a bed is formed on which a tired soldier can always pass dreamless hours. The courtyard was large enough to house the cars, and with branches of trees laid across them during the day, there was little danger of their being spotted by airplanes.

Drivers' Home Comforts

Another group picked out the ground floor of a picturesque little cottage with a clear rippling stream in front of it. The fact that there was a mortuary on the right and an army coffin maker on the left did not cause them to hesitate in their choice. But after one night they moved out, declaring that they could not face being eaten alive by rats. During the summer months at any rate many drivers of trucks and ambulances make a rule of sleeping aboard their vehicles. The practice simplifies life considerably, for there are no quarters to seek, no fear of getting another man's bunk and no insects or animals to disturb the peacefulness of the night.

NEW ACCESSORY ASSOCIATION

Atlantic City, N. J., April 23—An organization of manufacturers of automotive electric accessories has been formed here, and it will be known as the Automotive Electric Association. The purpose of the organization is to improve and develop this branch of business through standardization and friendly interchange of experience with reference to design and manufacture. The officers are: President, G. Brewer Griffin, Pittsburgh, Pa.; vice-president, C. O. Mininger, Toledo, Ohio; secretary, G. S. Cole, Cleveland, Ohio; and treasurer, C. L. Amos, Syracuse, N. Y. The next meeting will be at Hot Springs, Va., May 17-19.

Owen Magnetic in Film

Motion Pictures Help Demonstrate Operation of System at Meeting

Electric Power Cited as Advantage to Railroad

NEW YORK, April 20—A description of the operation of the system of the Owen magnetic transmission formed the subject of last night's paper before the Metropolitan Section of the Society of Automotive Engineers. The speaker was Walter S. Goll, who has charge of manufacture of the transmission at the Fort Wayne plant of the General Electric Co. The description of the method of operation of the transmission was very lucid and was illustrated by lantern slides showing diagrams of the car which have several times been published in MOTOR AGE, together with details of the electric circuits on the different speeds.

At the conclusion of the paper a series of motion pictures was shown, which demonstrated very clearly the special virtues of the magnetic transmission. They showed the car climbing a stiff grade at a very low speed; how it could be allowed to run backward and then be stopped and moved forward again slowly by closing and opening the throttle. Another series showed the wheel climbing over a large rock, and it was noticeable that the action was so smooth and general that practically no bounce occurred, although the stones in question must have been at least a foot high.

In opening the discussion, Mr. Potter of the Chicago, Milwaukee & St. Paul railroad spoke on the advantages of electric power in railroad work. He said that the operation of railroads in mountainous country had been completely revolutionized by the electric locomotive. Two particular advantages were to be noted. First, the electric engine operates more efficiently when it is well cooled, which means that its power increases in winter and decreases in summer, exactly the reverse of what happens with steam locomotives. At the same time, the rolling resistance of a train is greater in winter than in summer. With steam power the weight of the train must be cut down in winter, but with the electric power a balance is struck automatically, which enables the same size of train to be operated winter and summer.

COOLING FAN NEGLECTED

Cleveland, Ohio, April 21—Design and capacity of the cooling fan are not given the attention they deserve, according to A. K. Schanze, who addressed the Cleveland section of the Society of Automobile Engineers last night.

Mr. Schanze pointed out very clearly the necessity of unrestricted and ample water-jackets, especially in motors using the thermo-syphon cooling system. He also stated that in a number of motors which had come under his supervision that the circulating pumps and radiators were of such designs that the water was all pumped out of the bottom of the radiator, so that for short intervals of time there was really no circulation taking place in the motor, until the water had again reached the bottom of the radiator, at which point the pump was located.

The author then discussed radiator cooling fans, their pulleys and bearings. He stated that in order to cut the cost of radiator manufacture, do away with objectionable noises and trouble, better fans should be used. He stated that in his experience he had found the multi-blade fan far more powerful and efficient than any fan yet produced, as it produced far more breeze at much less power consumption.

At the conclusion of the paper Louis Schwitzer, production manager of the Empire Automobile Co., Indianapolis, Ind., took exception to this statement. He said that in road tests the flat-blade fan had been found much more satisfactory. He substantiated his statements with several figures.

Stephen Jenecick, Climax Motor Devices, Cleveland, said the reason for Mr. Schwitzer's statement was the fact that the multi-blade fan was so much more efficient that it delivered far more air than could escape from behind the radiator and under the hood. Mr. Jenecick also stated that there was plenty of very excellent data available for fan design, and that it still remains a question for the motor car designer to decide as to the amount of air necessary, available radiator space, etc. These given, the fan and radiator manufacturers would have definite specifications to work upon.

Excerpts from Mr. Schanze's paper will appear in an early issue.

STEGEMAN INCREASES CAPITAL

Milwaukee, Wis., April 23—The Stegeman Motor Car Co. has increased its capital from $100,000 to $200,000. The following changes in personnel have been made: L. G. Schertl, secretary-treasurer and sales manager, with Oscar Stegeman remaining president and F. W. Apel appointed assistant sales manager. The directors include Oscar Stegeman, Frank H. Parker, vice-president, L. G. Schertl, Frederick Gettelman, Faustin Prinz, Adam Mayer and C. P. Bossart.

WISCONSIN MOTOR RESERVE

Milwaukee, Wis., April 21 — A motor transport reserve as a part of the Wisconsin national guard is being established under the auspices of the Wisconsin State Automobile Association, which intends to enlist from 15,000 to 25,000 private owners in the state to pledge their cars and services of themselves or their drivers to give the Wisconsin infantry a mobility that is possible only with motor vehicles.

As soon as a sufficient number of pledges have been received, the reserve will be organized formally. The administration will be in the hands of a council of five. In each city or village, a transport company with one captain and two lieutenants will be organized. The plan contemplates placing a company in each place where there is a militia organization. The salient idea

is facilitation of troop movements, which may be hampered through unforeseen contingencies, such as the destruction of railroad bridges, or other emergency which might halt railroad traffic.

Membership in the reserve is open to every motor car owner in the state. The intention is to form squadrons of the same make and model of certain cars, for the sake of uniformity in repairs. Each company is to have a repair car attached to it.

FORD TRACTOR MAN INDICTED

New York, April 20—W. Baer Ewing, president of the Ford Tractor Co. of Minneapolis, New York and elsewhere, has been indicted under the Ohio Blue Sky Law on the charge of offering stock for sale in his company without a license. Ewing's enterprise has been under investigation by the vigilance committee of the Associated Advertising Clubs of the World, which some time ago issued a report citing some unfavorable facts about the organization and conduct of the company.

TIRE FRAUD ORDER ISSUED

Akron, Ohio, April 21—The postmaster-general has issued a fraud order against the Double Service Tire & Rubber Co. and Carl F. Geyer, Akron, Ohio, and the successor of this company, the Champion Rubber Co., Akron and Barberton, Ohio. The former concern was charged with selling as new a defective motor car tire, which was made by placing a new thin retread over an old tire or by combining two old worn tires, frequently purchased from junk dealers.

Carl F. Geyer is now under sentence of twenty-one months in the Atlanta penitentiary on conviction of fraud. Wilmot A. Nash, Mark B. Miller and Max S. Glover also were indicted in the same case. Nash was fined $500; Miller entered a plea of guilty and is now awaiting sentence, while the indictment against Glover is pending.

The evidence showed that the only articles manufactured by the Champion Rubber Co. were fifteen toy balloons. Stock of the Double Service Co. was sold through the Bankers' Underwriters Association of Chicago, a concern against which a fraud order has been issued. Numerous instances were revealed where tires guaranteed to run 7000 miles gave a service varying from 8 to 300 miles.

TRACTOR MEET IN AUGUST

Fremont, Neb., April 21—The Fremont tractor demonstrations, which have been designated as the national tractor demonstrations, will be held Aug. 6-18.

HUDSON TEAMS AT CINCINNATI

Detroit, April 21—The Hudson Motor Car Cohas entered two Hudson super-six cars for the Cincinnati 250-mile race of May 30. Ralph Mulford and Ira Vail will drive. If the third car is finished in time it will be be entered and driven by Billy Chandler.

Gasoline Report at Last

After Two Years' Work Commission Fixes Blame on Standard

Legislation to Meet Conditions Is Recommended

WASHINGTON, D. C., April 24—The long-deferred report of the Federal Trade Commission on the price of gasoline was transmitted to the Senate to-day and the finding of the commission is that Standard Oil interests substantially dominate the gasoline industry—refining, pipeline transportation and marketing.

The commission's report suggests "in view of the variation of the product now sold as gasoline that only such petroleum products as contain a certain proportion of reasonably volatile elements shall be sold in interstate commerce as gasoline."

Despite dissolution of the so-called "oil trust" by the Supreme Court, the commission concludes that Standard Oil domination has had a "fundamental bearing" on gasoline prices, declared to have been arbitrarily increased.

In an exhaustive report of its investigation, under resolutions of Senators Gore and Owen of Oklahoma and its statutory authority, the commission declares, in substance, that real competition does not exist between the various Standard Oil companies because of interlocking stock ownership through the holding of a majority of shares in the constituent Standard companies by identical interests.

Legislation to meet these conditions is recommended by the commission. Also its evidence and findings have been transmitted to the Attorney General for appropriate action. The principal findings of the commission are:

That in a majority of marketing territories the Standard companies are dominant.

That the several Standard companies have maintained a distribution of territory in the marketing of gasoline and that no substantial competition in the chief petroleum products exists among the several Standard companies.

That this absence of competition is due to a community of stock ownership.

That the facts disclose such advances in prices of gasoline and such differences in price corresponding to Standard marketing territories as are not possible of explanation apart from the foregoing conditions.

The commission has not found conclusive evidence of collusion among the various Standard companies in violation of the dissolution decree.

That the combination of pipe lines with the other branches of the industry has tended to establish and perpetuate monopoly.

That gasoline has deteriorated in quality, a variety of products being sold under that name.

Recommendations of the commission include:

A law providing for the reopening of anti-trust cases on the application of the Attorney-General by a bill of review for the purpose of securing such modifications of decrees as new conditions may require.

Abolition, by legislation, in certain cases, of common stock ownership in corporations which have been members of a combination dissolved under the Sherman law.

Effective limitation upon common ownership of stock in potentially competitive corporations by withdrawing the power of voting and control.

Legislation which, while recognizing common ownership, would fix upon such common owners the responsibility for the acts of each of the several companies so owned, which prevent competition.

Segregation of the ownership of the pipe lines from the other branches of the petroleum industry.

Fixing, by Congressional legislation, of standards for gasoline.

Federal collection and publication of accurate statistics and information regarding the industry.

Urges Reopening of Case

In detail, the commission urged that when it finds, as in the case of the gasoline industry, an antitrust dissolution decree has not restored competitive conditions Congress might amend the Trade Commission act to authorize and direct the Attorney-General to reopen the case for review as to the efficacy of a dissolution decree. In such proceedings it is suggested that the commission's findings should be admissible evidence and that the courts should have power to make new decrees to insure competition.

Factors in Standard Oil domination cited in the Commission's report were:

Division of gasoline marketing into eleven territorial divisions, at least nine of which are said to be dominated by various Standard Oil companies.

Stockholders of the several Standard companies are, to a great degree, the same individuals or interests, more than half of the stock of the various companies being in the same hands. Moreover, the report states that leading Standard officers often hold considerable amounts of stock in two or more companies.

Standard Oil refineries produced more than 60 per cent of gasoline produced in 1915, sold about 65 per cent of the total marketed and held more than 70 per cent of gasoline stocks.

How Prices Soared

"Correspondence of the difference of prices (in 1915)," the commission's report says, "with Standard marketing territories, itself points to arbitrary price-making. But the arbitrary character of the inequalities in price is conclusively demonstrated by the facts that as between most of the territories there were no such differences in demand and supply. . . and the margin between cost and price was widely different in the different territories."

Wholesale prices rose between 75 and 85 per cent in 1915, according to the commission's report, and retail prices also soared. Only a part of the advance was declared due to increased demand and scarcity, the demand increasing 38 per cent in 1915 and the production but 7 per cent less. Very large profits were earned, as shown by the books of the companies and by enhanced stock market value of oil securities.

Tours from the Hoosier Capital

Week-End and Holiday Trips from Indianapolis

FOUR of the major cross-country highway converge at Indianapolis, the Hoosier metropolis and capital, which make it one of the main touring centers of the Middle West. Indianapolis is America's largest city not on navigable water. Located almost in the geographic center of Indiana, Indianapolis has a network of roads radiating from it which make the state probably the most accessible from a motoring standpoint of any in the Union. Indiana roads rank high in quality and quantity as well. From Indianapolis the tourist can begin many trips of one-, two- and three-day length and be sure of finding good gravel, macadam, concrete or brick roads practically the entire distance.

Before outlining the various tours out of Indianapolis, just a word of what the city itself has to offer is in order. It has 2000 acres of parks, mostly connected by a boulevard system, a speedway for motor racing which is the only one of its particular kind in this country, and is or has been the home of a number of illustrious men such as Vice-president Charles W. Fairbanks, James Whitcomb Riley, "the Hoosier poet," Meredith Nicholson, novelist, and others of note. Soldiers and Sailors monument, where for years the governor's residence was located, is in the exact center of the original city and from it four avenues radiate to the four quarters of the city. Here are some of the trips that may be taken with Indianapolis as the starting point:

To Crawfordsville—This trip measures 92 miles and takes the motorist through Clermont, Brownsburg, Pittsboro, Lizton, Jamestown, New Ross and Whitesville to Crawfordsville, returning the same way.

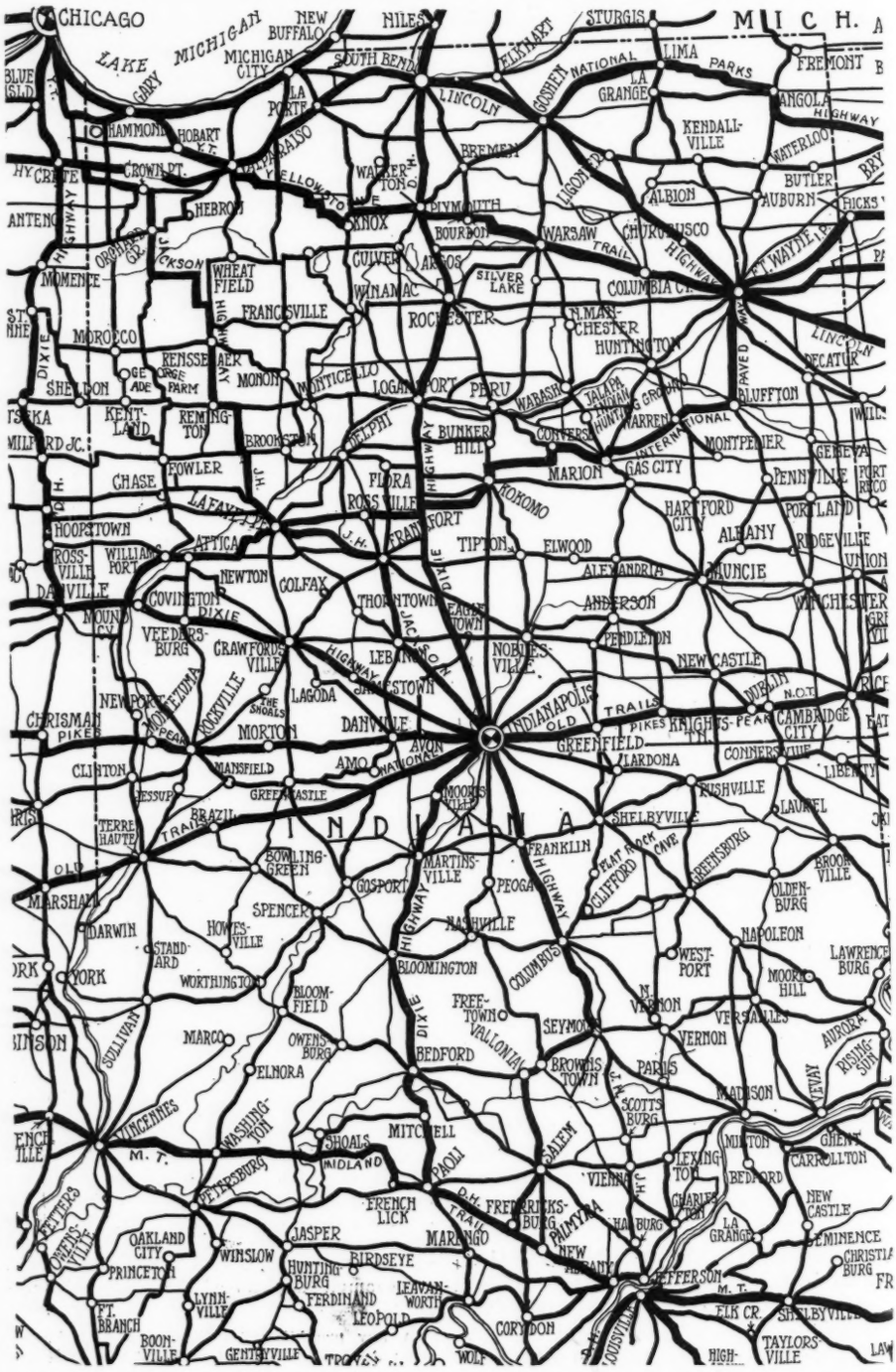
To Cincinnati—This is a very scenic trip through winding hills a part of the way. The distance for the round trip is 233 miles, by way of Hawthorn, New Palestine, Carrolltown, Fountaintown, Morristown, Arlington, Rushville, Connersville, Evart, Blooming Grove, Brookville, Cedar Grove, New Trenton, Harrison, Valley Junction, Cleves, North Bend, Sekitan, Addyston, Fernbank, Home City, Delhi, Trautman, Anderson's Ferry, Riverside, Sedamsville to Cincinnati.

To Terre Haute—This is a tour of 140 miles for the round trip over gravel and macadam roads, following the National Old Trails route. The cities en route are Bridgeport, Plainfield, Bellville, Stilesville, Mount Meridian, Putnamville, Manhattan, Peelsville, Harmony, Brazil and Seeleyville to Terre Haute. This is a very interesting trip over rolling country.

To Kokomo—This is a round trip of 102 miles going through Broad Apple, Carmel and Westfield. It takes one through farming country that is typical of the Hoosier state. Another way of reaching Kokomo from Indianapolis is by way of Noblesville, the route being through Allisonville, Noblesville, Cicero, Arcadia, Atlanta, Tipton and Sharpsville. The round trip over this route is 118 miles.

To Marengo Cave—The route to Marengo Cave is 136 miles each way, good gravel or macadam all the way and very scenic. The cave is said to rival the Mammoth cave in Kentucky, being recognized as the most beautiful cave in the Middle West. The route goes through Greenwood, Franklin, Amity, Taylorsville, Columbus, Bedford, Mitchell, Paoli and Valeene to Marengo.

To The Shades—The objective of this trip is one of Indiana's most picturesque summer resorts. One route lies through



Indianapolis is the hub of numerous touring possibilities, an idea of whose extent a glance at the map gives

Danville, Bellmore, Rockville and then north to The Shades, or northwest to Lebanon, then west to Crawfordsville and south to The Shades.

To Louisville—This is a good two-day tour, following the Jackson highway to Seymour, then southwest to Vallonia, south to Salem to Palmyra and then through Galena to New Albany and Louisville. This suggested route is better than trying to follow the Jackson highway all the way, that is from Seymour through Scottsburg and Memphis. The total distance is about 150 miles each way.

To Fort Wayne—This is a very popular over-Sunday tour of 241 miles. The route is through Brightwood, Lawrence, Oaklandon, McCordsville, Eden, Pendleton, Anderson, Alexandria, Marion, Mount Etna, Huntington and Roanoke to Fort Wayne. On this trip the Jalapa Indian hunting grounds should be visited.

To Wawasee Lake—This is a good week-end trip of 267 miles through Allisonville, Noblesville, Clare, Elwood, Mount Vernon, Wabash, Urbana, North Manchester, Collamer, North Webster to Syracuse and Lake Wawasee. Here is good fishing and boating and a very enjoyable place to spend Sunday. Return over the same route.

To Attica and Mudlavia—This is a trip of 79 miles one way, taking the tourist through Crawfordsville, known as "the Athens of Indiana." The towns en route are Clermont, Lizton, Mace, Crawfordsville, Elmdale, Wingate, Newton, Attica, Kramer and Mudlavia. The Mudlavia baths possess rheumatism curative properties.

To Newcastle—This trip measures about 50 miles each way, varying a little according to the options taken. The towns en route are Cumberland, Philadelphia, Greenfield and thence to Newcastle by way of Maxwell, Maple Valley, Shirley and Kennard, or by way of Cleveland, Charlottesville, Knightstown, Ogden and Dunreith to Newcastle. Roads are good macadam and the scenery along this route is attractive.

Next Week — Detroit as a Center of Week-End and Holiday Tours.

Answers to Route Information Inquiries

Saco, Mont.—Glacier Park—Osakis, Minn.

OSAKIS, Minn.—Editor MOTOR AGE—Give best route from Saco, Mont., via Glacier National Park, via Yellowstone Park to Osakis, Minn.; also state mileage.—Henry A. Hanson.

From Saco proceed to Ashfield, Bowdon, Malta, Wagner, Coberg, Savoy, Harlem, Zurich, Chinook, Havre, Kremlin, Rudyard, Bison, Galata, Shelby, Virden, Sevelle, Browning, Glacier Park, Belton, Kalispell, Rollins, Elmo, Ronan, Ravalli, Missoula, Drummond, Hall, Anaconda, Gregson Hot Springs, Butte, Twin Bridges, Sheridan, Ruby, Virginia City, Ennis, Hutchins Ranch, Lake P. O., Yellowstone, through Yellowstone Park, out at Cody, Wyo., Ralston, Powell, Warren, Fromberg, Laurel, Billings, Huntley, Pompeys Pillar, Custer, Forsyth, Rosebud, Hathaway, Miles City, Terry, Fallon, Mildred, Ismay, Westmore, Plevna, Baker, Marmarth, N. D., Rhame, Bowman, Scranton, Gascoyne, Reeder, Bucyrus, Hettinger, Gaynes, Butte, S. D., Petrel, N. D., Lemmon, S. D., Thunder Hawk, Morristown, Watauga, McIntosh, Tatanka, McLaughlin, Wakpala, Mobridge, Selby, Java, Bowdle, Ipswich, Aberdeen, Groton, Andover, Bristol, Webster, Waubay, Twin Brooks, Millbank, Big Stone City, Ortonville, Minn., Brown Valley, White Rock, Fairmount, Tenney, Elliott, Nashua, Elbow Lake, Thorsborg, Erdahl, Evansville, Brandon, Alexandria, Nelson, Osakis. This trip would approximate 2,000 miles.

Jackson, Mich.—Hutchinson, Kans.

Greensburg, Kans.—Editor MOTOR AGE—Give best route from Jackson, Mich., to Hutchinson, Kans. Also address of one or two automobile route books.—C. C. Raymond.

From Jackson, Mich., proceed to Parma, Albion, Marshall, Battle Creek, Augusta, Galesburg, Kalamazoo, Paw Paw, Lawrence, Watervliet, Riverside, Benton Harbor, St. Joseph, Stevensville, Baroda, Galien, Three Oaks, New Buffalo, Michigan City, Ind., East Gary, Miller, Gary, Calumet, Hammond, South Chicago, Chicago, Lockport, Minooka, Morris, Dwight, Pontiac, Lexington, Normal, Bloomington, Lincoln, Williamsville, Springfield, Litchfield, Mt. Olive, Staunton, Edwardsville, Marysville, Collinsville, East St. Louis, St. Louis, Mo., St. Charles, Wentzville, Wright City, Warrenton, Fulton, Columbia, Midway, Rocheport, New Franklin, Booneville, Arrow Rock, Marshall, Grand Pass, Waverly, Lexington, Wellington, Independence, Kansas City, Overland Park, Lenexa, Olathe, Edgerton, Ottawa, Agricola, Waverly, Emporia, Cottonwood Falls, Elmdale, Florence, Peabody, Walton, Newton, Halstead, Hutchinson, Kans.

Vols. 4 and 5 of the Automobile Blue Book, published by the Automobile Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip; price $3.00 each.

George, Iowa—Los Angeles. Cal.

George, Iowa—Give best route from here to Los Angeles, Cal.—John DeNeui.

From George, Iowa, go to George, Matlock, Sheldon, Boyden, Hull, Rock Valley, Inwood, Canton, Beloit, Fairview, Beresford, Hawarden, Akron, Westfield, Sioux City, Oakland, Omaha, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Grand Island, Shelton, Kearney, Odessa, Overton, Lexington, Cozad, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodge Pole, Sunol, Sidney, Potter, Kimball, Bushnell, Pinebluff, Egbert, Cheyenne, Buford, Laramie, Bosler, Lookout, Medicine Bow, Ft. Steele, Rawlings, Wamsutter, Red Desert, Tipton, Point of Rocks, Rock Springs, Green River, Bryan, Granger, Evanston, Castle Rock, Coalville, Gorgoza, Salt Lake City, Garfield, Grantsville, Iosepa, County Well, Fish Springs Ranch, Ibapah, Schelbourne Pass, Ely, Eureka, Austin, Fallon, Hazen, Wadsworth, Derby, Reno, Truckee, Alta, Colfax, Roseville, Sacramento, Woodbridge, Stockton, Tracy, Livermore, Oakland, San Francisco—from which point go down the coast via inland route through Fresno and Bakersfield to Los Angeles. The inland route is most preferable at this time on account of road construction now in course on the coast route.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Publishing Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Macomb, Ill.—Geraldine, Mont.

Macomb, Ill.—Editor MOTOR AGE—Give route from here to Geraldine, Mont. I prefer a southerly route.—Ross Elwell.

From Macomb, Ill., proceed to Bushnell, Abingdon, Galesburg, Henderson, Rock Island, Davenport, Ia., Durant, Iowa City, Oxford, Marengo, Grinnell, Colfax, Des Moines, Redfield, Monteith, Mindon, Omaha, Elkhorn, Waterloo, Fremont, Richland, Grand Island, Kearney, Lexington, North Platte, Ogallala, Big Springs, Lodgepole, Sidney, Bushnell, Pinebluff, Wyo., Burns, Cheyenne, Chugwater, Wheatland, Orin Junction, Douglas, Glenrock, Casper, Los Cabin, Thermopolis, Worland, Manderson, Basin, Otto, Burlington, Cody, Ralston, Warren, Fromberg, Billings, Laurel, Park City, Columbus, Merrill, Big Timber, Livingston, Bozeman, Three Forks, Helena, Great Falls, to Geraldine.

We would refer you to the Automobile Blue Books published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., for running directions of this trip.

Aberdeen, S. D.—Kalispell, Mont.

Conda, S. D.—Editor MOTOR AGE—Give outline of trip from Aberdeen, S. D., to Roundup, Lewistown, back to Bozeman, Butte, Missoula, then to Dixon, Kalispell, to Great Falls, back to Havre, to Minot, Ellendale and back to Aberdeen.—A. E. Eske.

From Aberdeen, S. D., proceed to Mobridge, Lemmon, Marmarth, Miles City, Billings, Roundup, Lewistown, Columbus, Livingston, Bozeman, Three Forks, Butte, Deer Lodge, Drummond, Missoula, Dixon, Polson, Kalispell. Ship your car from Apgar over to Glacier Park Station. Proceed to Cut Bank, Choteau, Great Falls, Loma, Havre, Malta, Glasgow, Williston, Minot, Devils Lake, Grand Forks, Casselton, Vargo, Valley City, Jamestown, Aberdeen.

We would refer you to the Automobile Blue Books published by the Automobile Blue Book Pub. Co., 910 Michigan Ave., Chicago, for complete running directions of this trip.

Columbus, Ga.—Los Angeles, Cal.

Columbus, Ga.—Editor MOTOR AGE—Would like to know best route from here to Los Angeles, through New York.—Theodore Chase.

From Columbus, Ga., proceed to Cataula, Hamilton, Chipley, LaGrange, Atlanta, Druid Hills, Decatur, Ingleside, Clarkston, Stone Mountain, Snellville, Grayson, Between, Monroe, Athens, Neese, Ila, Franklin Springs, Royston, Hartwell, Ga., Browns Ferry, Anderson, S. C., Greenville, Greer, Spartanburg, Converse, Cowpens, Gaffney, Blacksburg, Grover, Kings Mountain, Charlotte, Harrisburg, Concord, Kannapolis, China Grove, Salisbury, Spencer, Lexington, Thomasville, High Point, Jamestown, Greensboro, Graham, Mebane, Hillsboro, Durham, Bragtown, Stem, Oxford, Stovall, Bullock, N. C., Clarksville, Boydton, South Hill, Kenbridge, Blackstone, Petersburg, Manchester, Richmond, Ashland, Coatesville, Mantico, Chilesburg, Partlow, Snell, Spotsylvania, Fredericksburg, Falmouth, Mountain View, Garrisonville, Dumfries, Occoquan, Lorton, Accotink, Alexandria, Washington, D. C., Beltsville, Laurel, Baltimore, Kingsville, Bel Air, Churchville, Aberdeen, Havre de Grace, Perryville, Charlestown, Elkton, Md., Newark, Del., Wilmington, Marcus Hook, Chester, Toll-gate, Norwood, Toll-gate, Darby, Philadelphia, Bustleton, LaTrappe, Langhorne, Pa., Trenton, N. J., Lawrenceville, Princeton, Kingston, Franklin Park, New Brunswick, Metuchen, Rahway, Elizabeth, Jersey City, Weehawken, New York City, St. George, Port Richmond, Graniteville, Howland Hook, Elizabeth, Springfield, Summit, Basking Ridge, Bernardsville, Chester, Washington, Easton, Allentown, Kutztown, Kirbyville, Reading, Reinholds, Denver, Ephrata, Mechanicsburg, Lancaster, Gettysburg, Blue Ridge Summit, Waynesboro, Hagerstown, Md., Clear Spring, Indian Springs, Hancock, Cumberland, Frostburg, Grantsville, Keysers Ridge, Addison, Pa., Somerfield, Farmington, Hopwood, Uniontown, Brownsville, West Brownsville, Centerville, Beallsville, Washington, Claysville, West Alexander, Elm Grove, W. Va., Wheeling, Bridgeport, Ohio, Cambridge, Zanesville, Jack-

sonville, Newark, Granville, Columbus, Springfield, Vandalia, Richmond, Ind., Eaton, Richmond, Centerville, Germantown, Cambridge City, Dunreith, Knightstown, Greenfield, Indianapolis, Danville, Rockville, Lyford, Clinton, Centenary, Jacksonville, Paris, Ill., Grandview, Ashmore, Charleston, Mattoon, Shelbyville, Pana, Nokomis, Hillsboro, Litchfield, Mt. Olive, Staunton, Edwardsville, Marysville, Collinsville, East St. Louis, St. Louis, Mo., St. Charles, Wentzville, Wright City, Warrenton, Fulton, Columbia, Rocheport, New Franklin, Booneville, Arrow Rock, Marshall, Grand Pass, Waverly, Lexington, Wellington, Levasy, Independence, Kansas City, Overland Park, Kan., Lenexa, Olathe, Edgarton, Ottawa, Waverly, Emporia, Cottonwood Falls, Elmdale, Florence, Walton, Newton, Halstead, Hutchinson, Nickerson, Sterling, Lyons, Great Bend, Larned, Kinsley, Dodge City, Cimarron, Garden City, Deerfield, Lakin, Kendall, Syracuse, Coolidge, Holly, Colo., Granada, Lamar, Hasty, Las Animas, Hadley Sta., LaJunta, Timpas, Thatcher, Tyrone, Hoehne, Trinidad, Raton, Maxwell, French, Springer, Colmor, Las Vegas, San Jose, Pecos, Glorieta, Canoncito, Santa Fe, Domingo, Albuquerque, Kirkpatrick Spring, Becker, Socorro, Magdalena, Quemado, Springerville, Cooleys Ranch, White River Indian School, Rice, Globe, Roosevelt Dam, Fish Creek, Mesa, Tempe, Phoenix, Buckeye, Palo Verde, Arlington, Agua Caliente, Palomas, Antelope Hill, Dome, Yuma, Knob Siding, Holtville, El Centro, Campo, La Mesa, San Diego, North San Diego, Delmar, San Juan Capistrano, Irvine, Tustin, Santa Ana, Los Angeles, Cal.

Raton, N. M.—Siloam Springs, Ark.

Sugarite, N. M.—Editor MOTOR AGE—Give route from Raton, N. M., to Siloam Springs, Ark., and approximate mileage.—A. L. Brockman.

From Raton, N. M., proceed to Trinidad, Thatcher, LaJunta, Las Animas, Lamar, Granada, Holly, Colo., Syracuse, Kendall, Lakin, Dodge City, Spearville, Dundee, Lyons, Sterling, Hutchinson, Halstead, Newton, Wichita, Winfield, Independence, Joplin, Mt. Vernon, Springfield, Marshfield, Hartville, Mountain Grove, Willow Springs, to Siloam Springs.

Escanaba, Mich.—Duluth, Minn.

Escanaba, Mich.—Editor MOTOR AGE—Give route from Escanaba to Duluth. What is distance between these places and also between Chicago and Detroit.—Ned Moran.

From Escanaba, proceed to Spalding, Iron Mountain, Iron River, Marenisco, Ashland, Duluth.

The distance between Escanaba and Duluth is about 240 miles and from Chicago to Detroit 290 miles, depending, of course, upon the routes taken.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Elgin, Ill.—San Francisco, Cal.

Elgin, Ill.—Editor MOTOR AGE—Give best route from here to the Pacific coast.—Donald S. Hubbell.

From Elgin proceed to Rockford, Dixon, Sterling, Erie, Hillsdale, Moline, Davenport, Durant, Moscow, Iowa City, Coralville, Marengo, Victor, Grinnell, Kellogg, Newton, Altoona, Des Moines, Redfield, Monteith, Exira, Minden, Underwood, Omaha, Neb., Elkhorn, Fremont, Schuyler, Duncan, Central City, Grand Island, Shelton, Kearney, Odessa, Overton, Lexington, Cozad, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodge Pole, Sunol, Sidney, Potter, Kimball, Bushnell, Pinebluff, Egbert, Cheyenne, Buford, Laramie, Bosler, Lookout, Medicine Bow, Fort Steele, Rawlings, Wamsutter, Red Desert, Tipton, Point of Rocks, Rock Springs, Green River, Bryan, Granger, Evanston, Castle Rock, County Well, Fish Springs Ranch, Ibapah, Schelbourne Pass, Ely, Eureka, Austin, Fallon, Hazen, Wadsworth, Derby, Reno, Truckee, Alta, Colfax, Roseville, Sacramento, Woodbridge, Stockton, Tracy, Livermore, Oakland and San Francisco. From San Francisco go down the coast via inland route through Fresno and Bakersfield to Los Angeles. This route is more preferable at this time on account of road construction now in process on the coast route.

Vols. 5, 7 and 8 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Mt. Vernon, Ia.—Golconda, Ill.

Mr. Vernon, Ia.—Editor MOTOR AGE—Give best route from here to Golconda, Ill.—D. L. Stears.

From Mt. Vernon, proceed to Marion, Cedar Rapids, Sheneyville, North Liberty, Iowa City, W. Liberty, Atalissa, Moscow, Wilton Jct., Durant, Davenport, Rock Island, Milan, Swedonia, New Windsor, Alpha, Henderson, Galesburg, Knoxville, Brimfield, Peoria, E. Peoria, Groveland, Dillon, Delavan, New Holland, Middletown, Springfield, Rochester, Roby, Taylorville, Vanderville, Nokomis, Vera, Vandalia, Bluff City, Augsburg, Salem, Dix, Mt. Vernon, Bonnie, Ina, Benton, Frankfort, Marion, Crab Orchard, Harrisburg, Eddyville, Waltersburg, Golconda.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Norfolk, Va.-Richmond, Va.

Driver, Va.—Editor Motor Age—Give Norfolk to Richmond route.—W. R. Winner.

From Norfolk, proceed to Sewells Point, thence to Newport News, Denbigh, Leehall, Williamsburg, Lightfoot, Toano, Barhamsville, New Kent, Richmond.

Volume 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Warren, Ark.-Hopkinsville, Ky.

Warren, Ark.—Editor MOTOR AGE—Give best route from here to Hopkinsville, Ky.—I. B. Mendenhall.

From Warren, proceed to Little Rock, Galloway, Lonoke, Prairie Center, Hazen, Clarendon, Brinkley, Forrest City, Madison, Ferry over Mississippi, Memphis, Tenn., Raleigh, Bartlett, Ellendale, Arlington, Gallaway, Braden, Mason, Stanton, Brownsville, Harvey, Jackson, Rollins, Springcreek, Terry, Huntingdon, Camden, Tennessee River Ferry, Trotters Landing, Hustburg, Waverly, McEwen, Dickson, Charlotte, Bellburg, Pardue, Cumberland River Ferry, Ashland City, Bordeaux, Nashville, Springfield, Cedar Hill, Adams, Clarksville, Ringgold, Tenn., Hopkinsville, Ky.

Volumes 5 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Huntington, W. Va.-New York

Huntington, W. Va.—Editor MOTOR AGE—Give best way to go from here to New York.—Dr. Earl B. Gidoile.

From Huntington proceed to Charleston, Marmet, Montgomery, Gauley Bridge, Ansted Sta., Rainelle, Meadow Bluff, Lewisburg, Caldwell, White Sulphur Springs, Covington, Va., Ashwood Tollgate, Hot Springs, Warm Springs, Bath Alum Springs, Fairview, Deerfield, Churchville, Staunton, Mount Sidney, Burketown, Mount Crawford, Harrisonburg, Lacey Springs, New Market, Mt. Jackson, Edinburg, Woodstock, Maurertown, Toms Brook, Strasburg, Middletown, Stephens City, Kernstown, Winchester, Va., Berryville, Gaylord, Va., Rippon, W. Va., Charlestown, Harpers Ferry, Knoxville, Md., Frederick, Ridgeville, Cooksville, W. Friendship, Ellicott City, Catonsville, Baltimore, Kingsville, BelAir, Churchville, Aberdeen, Havre de Grace, Perryville, Principio Furnace, Charlestown, North East, Elkton, Newark, Del., Wilmington, Marcus Hook, Pa., Chester, Norwood, Darby, Philadelphia, Parry, Moorestown, Mt. Holly, Pemberton, Wrightstown, New Egypt, Cassville, Lakewood, Adephia, Freehold, Marlboro, Matawan, South Amboy, Perth Amboy, Rahway, Elizabeth, Newark, Jersey City, Weehawken, New York.

Volume 3 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Fairfield, Ia., to Thermopolis, Wyo.

Fairfield, Ia.—Editor MOTOR AGE—Give route from here to Thermopolis, Wyo.—Mrs. Wm. Schlief.

From Fairfield proceed to Batavia, Agency, Ottumwa, Fremont, Oskaloosa, Pella, Prairie City, Des Moines, Adel, Redfield, Dale City, Monteith, Guthrie Center, Exira, Walnut, Avoca, Minden, Underwood, Weston, Omaha, Neb.; Elkhorn, Valley, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Central City, Grand Island, Wood River, Shelton, Gibbon, Kearney, Odessa, Elm Creek, Lexington, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodgepole, Sunol, Sidney, Potter, Dix, Kimball, Bushnell, Pinebluff, Wyo., Egberg, Burns, Cheyenne, Chugwater, Glendo, McKinley, Orin Junction, Douglas, Glenrock, Casper, Johnson Ranch, Powder River, Powder River Ford, Hells Half Acre, Waltman, Arminto, Lost Cabin, Reids Ranch, Thermopolis.

Volume 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains full running directions for this trip.

Detroit, Mich., to Omaha, Neb.

Greenwood, Neb.—Editor MOTOR AGE—Give route Detroit to Omaha and mileage.—N. H. Meeker.

From Detroit, Mich., proceed to Ypsilanti, Milan, Dundee, Temperance, West Toledo, O., Toledo, Wauseon, Archbold, Bryan, Edgerton, O., Butler, Ind., Kendallville, Wawaka, Ligonier, Benton, Goshen, Dunlap, Elkhart, Mishawaka, South Bend, New Carlisle, Laporte, Westville, Valparaiso, Hobart, South Gary, Highland, Hammond, Ind., South Chicago, Ill., Chicago, Sterling, Galt, Lyndon, Erie, Hillsdale, Watertown, East Moline, Moline, Davenport, Ia., Durant, Wilton Junction, Moscow, Atalissa, West Liberty, Iowa City, Coralville, Oxford, South Amana, Marengo, Victor, Brooklyn, Grinnell, Kellogg, Newton, Colfax, Altoona, Des Moines, Van Meter, Stuart, Adair, Atlantic, Oakland, Council Bluffs, Omaha.

The trip one way would approximate 900 miles.

Complete running directions would be found in Vols. 4 and 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago.

Beloit, Kans.-Cedar Rapids, Ia.

Beloit, Kan.—Editor MOTOR AGE—Give best route from here to Cedar Rapids, Ia. Expect to be in Iowa a month or six weeks. Will I have to get a license in that state?—R. L. Metcalf.

From Beloit, Kans., proceed to Formoso, Lovewell, Webber, Superior, Neb., Nelson, Fairfield, Harvard, Hastings, Fairmont, Exeter, Friend, Lincoln, Havelock, Louisville, Omaha, Council Bluffs, Underwood, Minden, Avoca, Walnut, Elk Horn, Exira, Guthrie Center, Monteith, Dale City, Redfield, Adel, Des Moines, Colfax, Newton, Kellogg, Grinnell, Brooklyn, Victor, Ladora, Marengo, Middle Amana, Amana, Cedar Rapids.

Non-resident motorists are allowed thirty days in Iowa without purchase of license.

Volume 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Practical Traffic Signals

Reader Outlines Opinion of What Devices Should Be to Be Most Advantageous

ANTIGO, Wis.—Editor MOTOR AGE—I have noted the discussion of what constitutes the practical traffic signal, which has been carried on through the columns of MOTOR AGE.

There no doubt is a crying need for a practical signal device, and the failure of the many that are now on the market is due to the fact that they are either confusing as to their object, the mechanism is impracticable, or the manner of control is not proper, and all are subject to the possibility of the operator giving the wrong signal in emergency cases. It is my belief that the device should be neither automatic nor under electrical control, in order positively to avoid giving a wrong signal, and in order that a signal may be given and set until the driver's intention has been carried out.

Electric Control

A device under electric control that provides the different signals that are required, that is, indicate a turn right, left, or stop, slow or ahead, would have to have at least three control buttons, and as there is always more or less vibration of the steering wheel, one is very liable to press the wrong button and thus convey to a driver behind him, or the pedestrian, a signal entirely different from his intention and action. If the indicator is not in a place where the driver can always see it he is unaware of his mistake, and thus should an accident occur, there is question as to who is liable for the probable damage.

One of your correspondents says a warning to a driver in the rear that the car ahead means to act in some way other than going straight ahead, is all that is necessary, as the driver behind will slow down—go out of gear or stop and wait to see what the car ahead means to do. Why should the car behind be forced to stop if there can be a signal positively to convey the intended action of the driver ahead? He also says a signal in front is not necessary, as a traffic officer has control of the driver, and would not notice any signal. If in a closed car and his vision through the windshield should be impaired by reason of rain or snow, how can one signal quickly to the officer that he desires to turn, or how can a pedestrian know that a driver will turn in their direction under these circumstances?

It seems to the writer that there is need for the device to show both in front and in rear, a right and left signal to turn and by pointer only, as letters are apt to be confused with those and the figures of the license number plate. The word "stop" should not appear on a rear signal, especially if controlled automatically by the brake pedal, as very frequently drivers press their brake to slow and do not mean to stop, or for the driver behind to stop. However, the signal is shown to him and if he acts upon it, and finds there was no reason for his having done so, he has reason to disregard such signals in future.

The practical device is one that can be operated at will and set to remain several seconds in the position indicating the driver's intention. The proper place is on the front or rear fenders, as this position is conspicuous and not so likely to be confused with other fixtures about the car.

My idea of a practical signal is: First, an arrow is only meant to do one thing, and that is to point. A very small child knows this, and if the arrow is large and in plain view, its direction is grasped and meaning sensed in a fraction of a second. The arrow should be clearly visible day or night for a distance of 75 or 100 yd. and its meaning will be understood as it would occupy a position on the fenders where nothing else is placed, or seldom, at least, and it would not be obscured by anything. It should be neat and not so large as to look bulky and mar the appearance of the car. The driver could always see that it is working and know that the one in the rear is, also, for one would not work without the other acting in the same way. Its action would be instantly observed. When in neutral the arrow would point ahead.

A driver could operate a signal of this kind as easily as he could press a button to shift an electrically-controlled device. A fraction of a second only is required to push or pull a control lever and if one wished to illuminate the arrows he would close the switch in the handle as he grasped it.

An electrical device gets out of order because of lack of current in case of a short circuit in the wiring. Damp or cold weather makes them stick and fail to operate. The device controlled by the steering wheel is always jiggling back and forth because of the swaying of the car. The ones operated by the brake are not proper for reasons previously mentioned.—M. B. Mills.

OHIO ROAD LAWS ENDANGERED

Columbus, Ohio, April 20—Through the discovery of a blunder committed by an employe of the printing department, made by the attorney of the Ohio Good Roads Federation, it is believed in official quarters that after June 28 next there will be no state highway department in Ohio and no laws for the construction and repair of inter-county and main market roads.

The intelligence has been conveyed to Governor James M. Cox, and it is probable that a test suit will be filed in the Supreme Court in an endeavor to save the law. If this fails, the situation may compel the calling of an extra session of the general assembly. In the opinion of many attorneys who have been consulted there is little hope of success in the courts because of the decisions of the last two years in matters of defective legislative bills.

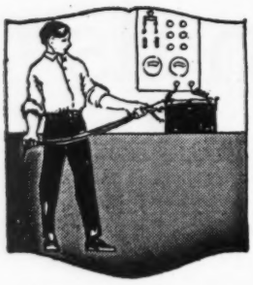
The blunder consisted in substituting the title of the bill for the absolutely necessary enacting clause. This had the effect of authorizing no new legislation while the repealing clause, which is flawless, does away with all the new highway laws enacted since the beginning of the good roads movement.

IOWA 1916 FATALITIES HIGH

Des Moines, Iowa, April 20—Reckless driving is given as the main reason for Iowa's gruesome record of 199 persons killed in highway accidents during 1916. Altogether, newspapers carried reports of 2834 motor car accidents, with more or less serious injury to 2,574 persons. The recklessness was manifested in too high speed for the condition of the road and the traffic on it. Ninety per cent of the accidents were due to motor cars, and most of the 90 per cent was due to recklessness, according to the highway commission.

MARK HIGHWAY FEEDERS

Chicago, April 20—Objections raised by park commissioners, who control the Chicago boulevard system, against sign-boarding the boulevards to indicate the best ways of getting into the city from the Lincoln highway have been overcome, and members of the Chicago Automobile Trade Association through popular subscription will mark the feeders to the Lincoln highway from Dyer, Ind., and Geneva, Ill. They believe the investment will be well worth while, since it is felt a great many tourists over the Lincoln highway pass by Chicago because the road proper runs somewhat to the south of Chicago, striking Joliet and then turning north to Geneva. By marking the route in and out of Chicago, the dealers believe they will get much more tourist business.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note — Herewith is presented the fortieth installment of a weekly series of articles begun in MOTOR AGE *issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journa' Co., Chicago, in a size to fit the pocket conveniently.*

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a batery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage bateries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained.

Part XL—Combining Starting, Lighting and Ignition

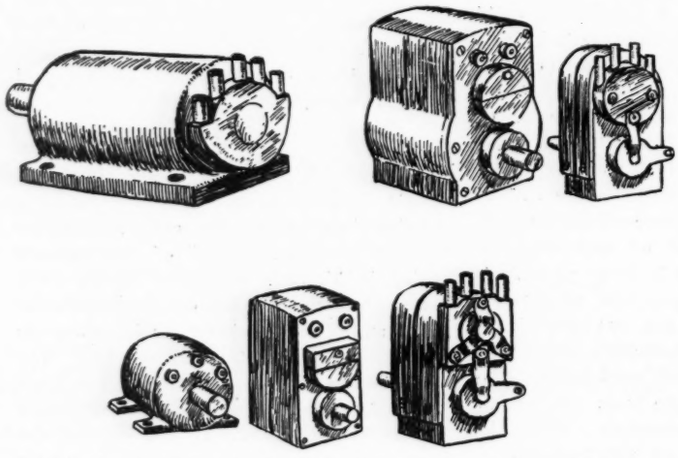


Fig. 234—Units of the three systems. Above, left—single-unit, motor-generator; above, right—two-unit, motor, generator with ignition separate; below—three-unit, a motor, a generator and ignition

THE complete electrical equipment of the modern motor car ordinarily includes the three functions, starting, lighting and ignition. To consider the equipment as a whole, all three functions must be taken into consideration, though in a great many installations the ignition function either is quite separate or nearly so from the other two functions.

Relation Between Functions

The equipment by which the starting, lighting and ignition functions are maintained is arranged in different ways, and it is on the arrangements that the first general classification of all systems is based, and the design of the different units depends on which of the arrangements is employed. The electrical equipment which performs the ignition, lighting and starting of the motor car consist of the following main pieces of apparatus:

First, for the ignition there must be a source of electrical energy, either a storage battery, dry battery, the familiar type of magneto generator or a generator which is not of the magneto type. In addition there must be means for transforming the low voltage current into a high voltage or high tension current and other means for distributing the current to the proper spark plug at the proper time.

Second, for lighting there must be a source of energy, such as a storage battery, which may be used in operating the lamps and signalling apparatus, and a generator which is equipped with the proper regulating devices and cutout so as to keep the battery fully charged.

Third, for starting the engine there must be an electric motor connected mechanically to the gasoline engine and connected electrically to the storage battery through the proper switches so that the battery will produce an electric current in the windings of the motor, causing its armature to revolve with sufficient force to turn the engine crankshaft over at the desired speed for starting. The battery producing the current to the windings of the motor must, of course, be charged in order that the battery be ready to meet any reasonable demands of the starting motor.

It is evident that the equipment required in performing any one of the above three functions need not be entirely independent of the equipment required in either or both of the other two. For example, the same storage battery and charging generator which supply energy for lighting the car may be used in producing current in the winding of the starting motor and, in many instances, for the ignition. Also, it has been found that other combinations of the equipment required in performing the above three functions may be made for the sake of lightness and simplicity.

There are, however, three fundamental parts to each system, no matter how the equipment required for these various functions may be interrelated, the ignition device, the charging generator and the starting motor. The manner in which these fundamental parts are related affords a means of classifying all starting, lighting and ignition systems into three classes—three-unit systems, two-unit systems and single-unit systems.

Difference in Names

Many manufacturers of these systems disregard the ignition feature in the nomenclature of their apparatus so far as the types of systems are concerned. Thus, they consider only two systems, the single-unit and the two-unit. The former comprises the type in which generator and motor are combined and the latter the type in which the generator and motor are separate. The ignition

may or may not be separate and does not affect their nomenclature.

Since the ignition is a part of the electrical equipment frequently used in combination with the generator, the division into one-, two- and three-unit types is considered the more logical. The units of the three systems are illustrated in Fig. 234.

Three-Unit Systems

The three-unit system is one in which the starting motor, the charging generator and the ignition device are separate machines, their only interconnections being to the common storage battery, though in some systems of ignition, where magneto alone is used, the ignition has no connection at all with the other electrical equipment. The component parts of a three-unit system in which the starting motor, generator and magneto are distinct is shown in Fig. 235. The illustration explains how the units receive power from, or deliver power to, the crankshaft of the engine.

Two-Unit Systems

Two-unit systems are those in which any two of the three functions are taken care of by a single machine, leaving the remaining unit to take care of the third function. The generator which supplies current to the battery may be fitted with an induction coil, contact breaker and distributor, so that it performs all of the functions of the ignition magneto and at the same time charges the storage battery. This leaves the cranking to be taken care of by a separate motor. Fig. 236 shows how the charging generator and ignition equipment are combined in a single unit, the starting motor being entirely separate, with the exception of its electrical connection to the same storage battery as the combined generator-ignition unit. Fig. 237 illustrates another design of this combination.

In some types of two-unit systems the starting motor and the generator are combined as a single unit, leaving the second unit to take care of the ignition. The ignition may be taken care of by a magneto in which case the ignition is entirely independent of the motor nad generator functions, or the ignition may be taken care of by an induction coil which draws current from the same storage battery used in combination with the generator and motor.

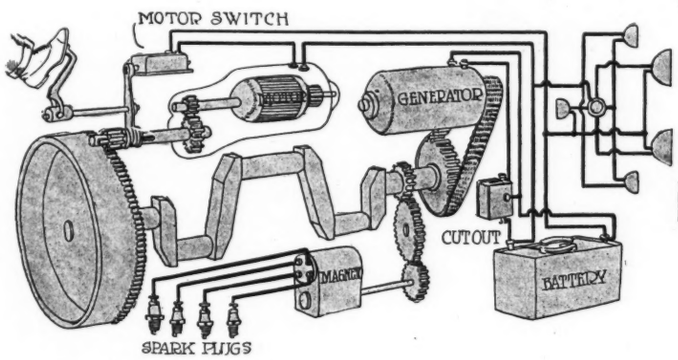


Fig. 235—Typical arrangement three-unit system, showing the mechanical and electrical connections of the separate units, the cranking motor, lighting generator and ignition magneto

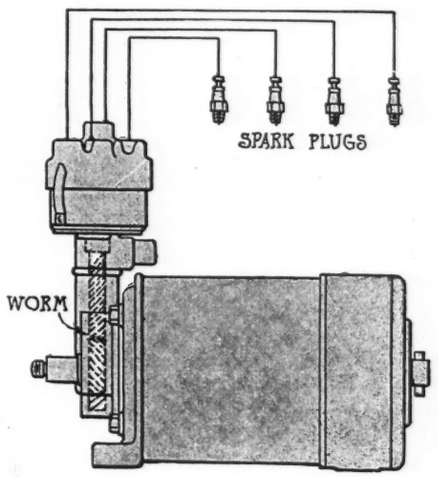


Fig. 236—One unit of a two-unit system. This is a combined lighting and ignition generator, the cranking apparatus being separate. The distributer is driven by a worm and vertical shaft

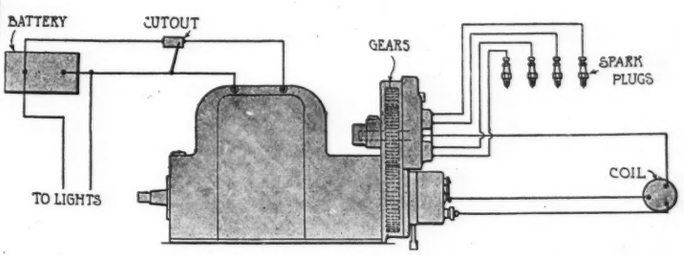


Fig. 237—A two-unit system similar to Fig. 236 except that the listributor is on a horizontal shaft

FACTORY ENLISTMENT SITUATION

Milwaukee, Wis., April 23—The following information furnished by the Cutler-Hammer Mfg. Co. might apply to other factories as well since the critical situation of the country has arisen. For instance, there are reports that the Milwaukee factory of the Cutler-Hammer company has been taken over entirely by the Navy Department and that in consequence the production of the usual commercial goods will be obstructed. The situation is this:

When, at the request of the President, the five national engineering societies undertook to obtain an inventory of the resources of the country under the auspices of the Naval Consulting Board, there was included in the inventory blank an inquiry as to whether or not the corporation reporting was in favor of an industrial reserve, which would keep skilled men at the benches in war time and would prevent their enlisting or being drafted for other service. About 70 per cent of the corporations reporting were in favor of this proposition and the nearest approach to it incorporated in any legislation was included in the Navy Bill and was termed the Naval Coast Defense Reserve. The provisions to this act made it possible for the Navy Department to enlist in various ranks skilled workers throughout the country. Under the terms of this enlistment the man was definitely sworn in as a member of the Reserve. He would be paid $1 a month during peace times, but under such conditions his liberty of movement would not be interfered with, except to report whenever he changed his position. In war time, however, he would become an enlisted man, could not resign, nor could he enlist in any other service, and, if occasion required, it would become immediately possible for the Navy Department to take charge of any such body of men and operate them in the shop and on government work for which orders were in hand.

The condition in the Milwaukee plant at the present time is that out of some 2000 about 400 shop men are enlisted in the Naval Coast Defense Reserve, and some forty in the testing room, engineering department and office force. There has been absolutely no interferences with the progress of work in the shop by the navy officials, nor is any anticipated, since this number of men would be ample to meet even emergency requirements of the navy.

DENVER CANVASSES OWNERS

Denver, Col., April 18—Two registration headquarters for motor car owners or drivers willing to volunteer the services of themselves or their cars for any motor branch of the military department of the Government have been opened in Denver at the Denver Motor Club and the Denver Tire Service, Inc. The plan is not strictly an enlistment process but rather a recording of persons willing to volunteer.

THINKS RUBBER TRADE HELPED

New York, April 20—The rubber trade is being benefited by the entrance of the United States into the war, according to Samuel P. Colt, president of the United States Rubber Co., who says the rubber goods manufacturers are now able to get larger supplies. Before the declaration of war it was necessary to get a pass for the importation of crude rubber into this country. The English authorities had a way of allowing only a part of the rubber desired to be shipped. For instance, if 400 tons were asked for, only 200 were received. But now that the United States has entered the war, England regards us as a rightful ally and is showing her friendship by helping out our business interests, an example being in the rubber trade, which is in the majority of cases receiving full shipments.

According to Mr. Colt, the United States Rubber Co. will show total sales this year of at least $150,000,000, one-third of which will be in tires.

From the Woman's Viewpoint

Woman's Work in the World War

Motor Service Means Wider Opportunities for Those Who Cannot Fight

WOMAN'S work is never done. No doubt the biggest reason for its seemingly indefinite limit is the constant advance in her opportunities. The women of Europe have such opportunities as never came their way before, and the active part they are playing in the motor ambulances and motor vehicles back of the first line trenches in Europe is specially interesting to the women of America since the entrance of the United States into the world war.

The British empire includes the women doing work of any kind for the army in that organization, whether they are serving in England or in France. About 30,000 English women are doing service for their country from a military standpoint. The women clerks are in the thousands. Women chauffeurs drive the trucks of the army service corps, the motor cars of the royal flying corps and the ambulance of the Red Cross. Some of them are mechanics and others are observers. The women who act near the first line are women who have been trained in the army service schools and picked for active service.

A woman drives the car of England's premier. A woman drives the car of one of England's generals, through shell fire and over mine-torn fields. A special department organizes women's services for the army. Lieutenant-General Sir Nevil Macready is the head of it. The British Government is very careful of the women who work for them, and especially careful of those who are employed in the munitions factories. There canteens supply hot meals, rest and ambulance rooms are provided and doctors and nurses are in constant attendance. The protection of women employed in the danger zones is the subject for scientific consideration. Every possible safeguard is taken.

Woman's work in the war is never done, and these are two who are always doing it

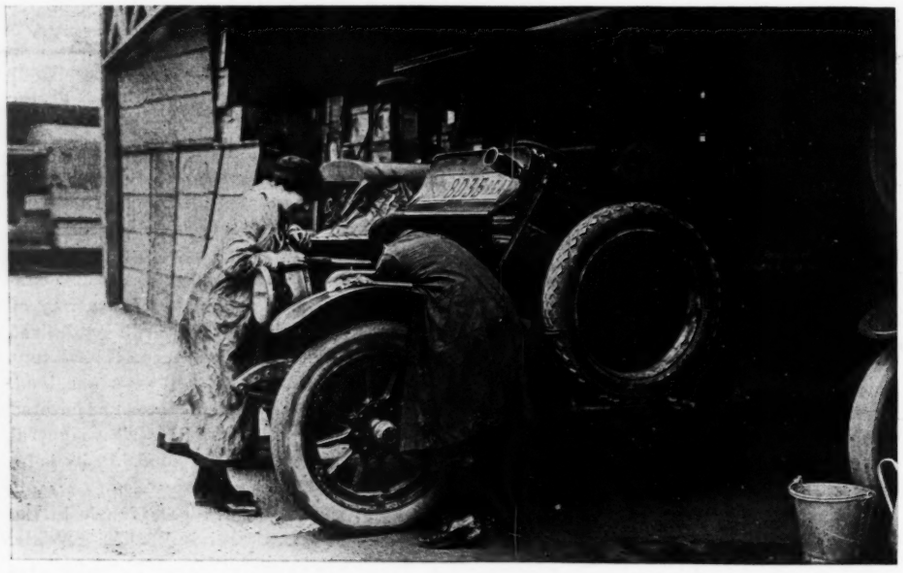
Canadian women have augmented greatly the ranks of women workers in the ambulance and other service in France. Canada has given a quarter of her men and more than $300,000,000 for the war and is giving more. Her women are as strong in proportion, and you can find them driving or repairing the motor ambulance that carries the wounded soldier from the battlefield to the Canadian hospitals in France.

The French women have the racial ardor of the French for service of the country. They are driving the few motor buses of the cities, acting as chauffeurs, delivering for the business establishments and, like the Canadian and English women, serving as Red Cross workers, both in nursing and in driving the motor ambulances.

American Women in France

America, too, has her place in the motor ambulance service of women in France. Just as the American aviators are flying for France, so are American women aiding, to a great degree through the Paris office of the American fund for French wounded. They bundle crates and cases on baggage trucks, we are told, and load the immense motor trucks. They are in the transport service, too. With the women of France, England and Canada, they drive the motor vans that travel all over the country on good and bad roads at any time of the day or night that their services are required.

No one can tell just what service the women of America may render to this country before all is said and done. Whatever that service is, however, it will find the women of America prepared, for the spirit that makes for action is manifest every day. The women's section of the Navy league is particularly active in motor preparedness. In the larger cities these women have formed classes for study in driving motor cars with the idea of driving ambulances when occasion arises. In addition, separate classes have been organized, and weekly meetings, at which the women actually learn something about the machines they may be called on to drive, are held.



In the work of the Canadian women in motor ambulance service in France, forewarned is forearmed, and here two of the Canadian women are getting a Buick ready for the road

Bryn Mawr Students Study Motor Repair

THE women of Bryn Mawr College now have a special motor repair course included in the preparedness work of the institution. A motor car and repair course for the students of Bryn Mawr was opened last week in the Spring Garden Institute.

The president and students of Bryn

Mawr were united in obtaining the new class. The institute at which the study will be made agreed to offer the course after a special request. To complete the course before the college closes for the summer, the students will have to finish the work in six weeks, and to do this they will have to spend more time than they would spend if it were a class in some city or town, such as is so frequent now. Three lessons of 2 hrs. each will be given every week.

A 9700-Mile Trip With $14 for Repairs

THE general opinion always has seemed to be that the woman could prove a factor of the greatest importance in eliminating waste in the household, thereby saving fuel, foodstuff and so on. The opinion, however, has not been extended as yet to motoring, especially on the long tour, which most often is under masculine control wholly. Here is an exception to touring in general that well might cause other motorists to think how they could go and do likewise.

Mrs. Miriam Thayer Seeley is a professor in the department of physical education for women at the Oregon Agricultural College at Corvallis, Ore. She owns a Maxwell which sees a good deal of service, the most recent of which was in a trip from Oregon to Boston, Mass., and back, or 9700 miles in all. She has made out a complete table, showing the expenses of the trip, for the benefit of other motorists, and it is reproduced herewith:

Complete operating expense, automobile trip—Maxwell touring car—from Corvallis, Ore., to Boston, Mass., and return—9700 miles:

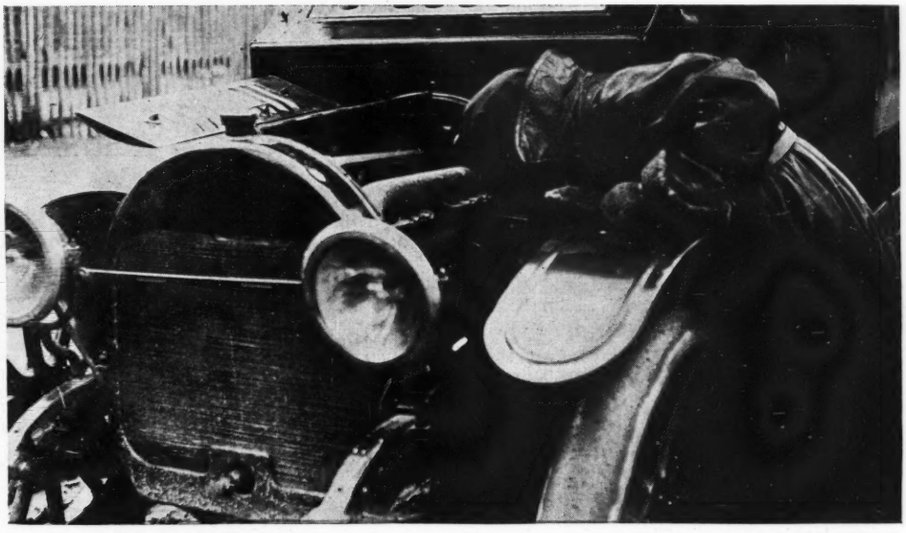
Total number of miles traveled east	4500
Total number of miles traveled west	5200
Daily average in miles covered—	
Plains	175
Mountains	150
Average number of miles per gallon of gasoline, transcontinental east	22.4
Average number of miles per gallon of gasoline, west from Chicago, with loaded trailer	17.2
Cost of gasoline going east	$50.11
Cost of gasoline going west, with loaded trailer	67.69
Cost of oil and grease going east	6.90
Cost of oil and grease going west, with trailer	8.66
Cost of food going east, two persons	19.58
Cost of food, going west—	
Boston-Chicago, two persons	$ 4.16
Chicago-Spokane, four persons	33.11
Spokane-Portland, two persons	3.87
	41.14
Repairs going east, including service	3.50
Repairs going west, including service	10.50
Tolls going east, bridge and ferry	4.40
Tolls going west, including admission to Yellowstone Park, $7.50	9.00
Cost of tires	

Rather difficult to estimate.

I used oversize tires of the same make as the Maxwell car is equipped, which gave more than 9000 miles.

MIRIAM THAYER SEELEY,
March 31, 1917. Corvallis, Ore.

Several interesting conclusions can be obtained from the table, among which are those as to the effect on gasoline mileage of carrying a trailer. The figures show that the average mileage without the trailer, going east, was 22.4; with the trailer, going west, 17.2. The tour was over different routes going and returning, however, as the mileage east was 4500 and west 5200. Minor repairs, in spite of the diversity of the roads followed, amounted to only $14.



This Canadian woman was not quite satisfied with the engine of her motor ambulance when this picture was taken

These are just a few of the women from Canada who are serving in Red Cross ambulance corps in France

One Engine for Car or Airplane

Miller Said to Be Largest Aluminum Powerplant

THE Miller engines, one of the four- and the other of the twelve-cylinder type, which have been in the making by the Harry A. Miller Mfg. Co., of Los Angeles, for more than a year, are said to symbolize the ambition of their designer, Harry Miller, to produce an American product that could compare favorably with or excel the high-speed engines that have been developed in Europe. Two of these engines have been completed. The four-cylinder is now mounted in the chassis of Barney Oldfield's old Delage racing car and will be campaigned this season. The twelve-cylinder has not been entirely assembled, but preliminary tests show that when once put in the frame it will be ready for immediate use. This is said to be the largest aluminum engine ever made in a single casting. It will require a crankshaft 67 in. long.

Both the four- and twelve-cylinder engines will become the property of Oldfield to use them as he sees fit. He claims to be sincere in his declaration that in a car powered by the twelve, he intends to go after all straightaway records and with the four to compete against the best in the field.

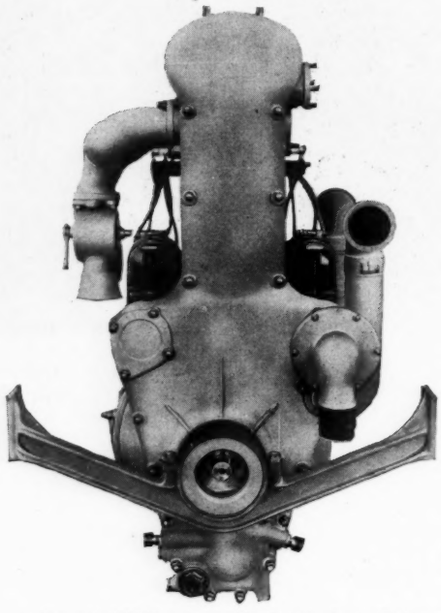
For Cars and Airplanes

The Miller engines are dual purpose—that is, adapted for both motor car and airplane. The engine block, pistons, inlet manifold, carbureter and other units are of aluminum-alloy construction. They are extremely accessible. Every moving part, with the exception of the crankcase, can be removed in remarkably short time without disturbing the position of the engine in the frame. The entire engine can be disassembled in less than an hour. The valve action and cylinder head can be removed in block. Removal of the front timing case uncovers the train of gears that actuate the magnetos and camshaft. Large crankcase plates give access to the crank chamber and, if desired, the connecting rods and pistons may be removed through the crankcase.

Another feature of high standardization of construction typified by the Miller engine is indicated by the fact that a double open-end wrench is all that is required to assemble or take down the engine, with the exception of the water pump construction, which necessitates the use of an adjustable wrench.

In the four-cylinder engine the bore is 3⅝ in. and the stroke 7 in., making the piston displacement 289 cu. in. The horsepower generated on a standard hydraulic water brake is 138 at 2950 r.p.m. The engine weight, complete with one carbureter and two magnetos, does not exceed 425 lb., so it is claimed.

The main body of the engine without the



Front of Miller four-cylinder engine. One wrench handles all bolts and nuts

detachable head is one casting of the Miller aluminum alloy, alloyanum, and comprises the barrel-type crankcase, sump and cylinder water jackets thereby making for extreme rigidity and strength. The cylinders themselves are sleeves of cast vanadium iron 5/36-in. thick, machined throughout, and having a flange at the top. They are dropped into place in the water jacket where an ingenious packing device makes the joints entirely water tight.

An important feature of this type of cylinder and jacket construction is the fact that it permits the use of larger cylinder sleeves up to a size of 4¼ in. in the same engine casting, the only result of this increased size being to slightly diminish the water space which is more than ample.

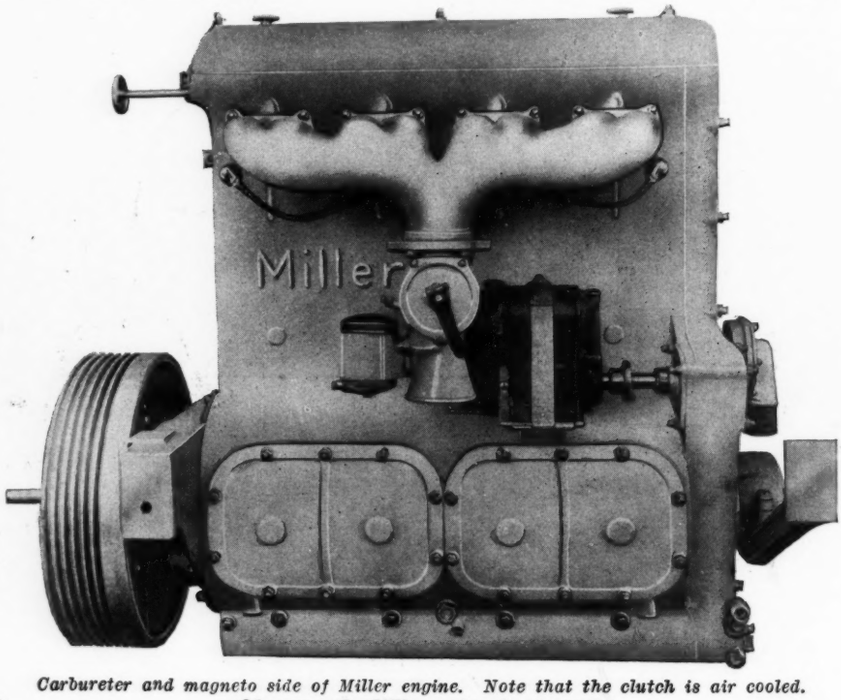
Actual contact of iron to aluminum is reduced practically to a minimum and consequently the water is brought into direct contact with almost the entire outer surface of the iron cylinders themselves; all of which results in a very high cooling efficiency.

The two-piece crankshaft of chrome vanadium, heat-treated steel runs on four large sets of ball bearings, one in front, one in the center, and two at the flywheel end with generous-sized oil rings to take care of lubrication.

Overhead Camshaft Drive

A train of five spur-cut gears, each mounted on a double row of ball bearings, drives the overhead camshaft from the front and are inclosed in an oil tight case with quick-detachable cover. The camshaft, hollow and very light, rides on five ball bearings which make allowance for even the slightest distortion and a constant feed of oil at pressure in the shaft lubricates the action at each cam, filling a sump into which the cams dip.

The cam unit deserves special attention in that it provides an extra follower cam to the roller which mechanically returns the forked rocker arm, each of which operates two valves and makes the latter



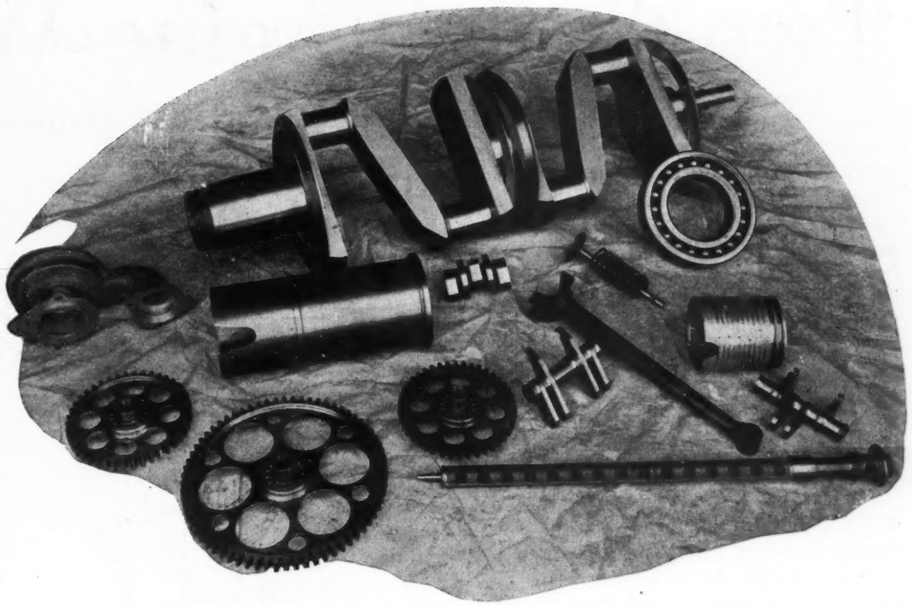
Carbureter and magneto side of Miller engine. Note that the clutch is air cooled. Of course the Miller carbureter is used

positive in its return, independent of the spring action. This feature is particularly desirable, allowing, as it does, the use of a strongly constructed rocker arm in connection with a very light valve spring. The valves, sixteen in number, have their seat directly in the aluminum of the cylinder head casting and are placed at an angle of 30 deg., the exhaust being 1 5/16 in. in diameter and the intake 2 in., all valves having a seat 1/16-in. wide and a lift of 3/8 in.

The alloyanum pistons weigh 1 lb. 2 oz. each and are well ribbed for strength and heat radiation. They provide their own bearing for the wrist pin, this alloy being well suited for this purpose, and carry two rings each of the Miller concentric type. Connecting rods are of tubular design and taper for maximum strength and minimum weight. They are chrome-vanadium forgings machined throughout and carefully heat-treated with four bolts at the big end clamping in place the babbitt-lined bronzes that make up the bearing, while at the small end which is split a single bolt holds fast the wrist pin and also keys it in position. The entire rod and piston assembly can be put into the engine with the crankshaft in place or removed therefrom through large hand holes, two on a side, which are provided for this purpose; a feature of accessibility which is sure.

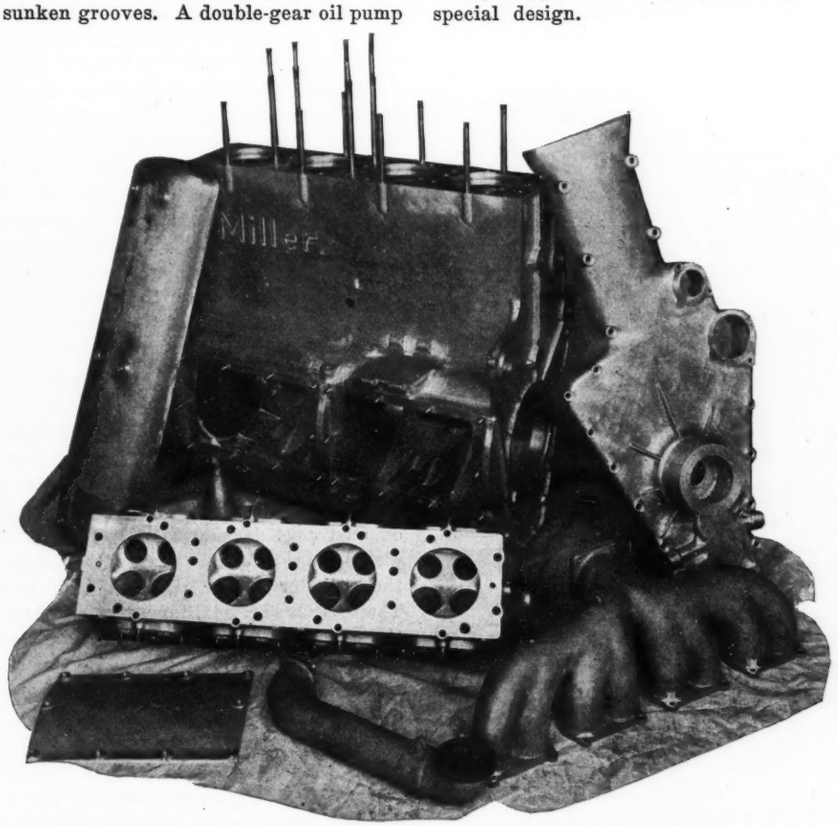
A large centrifugal pump placed at the front end of the crankshaft puts water directly into the jacket without manifold or piping, whence it is distributed into the head through large well spaced openings, guarded with individual ring gaskets set in sunken grooves. A double-gear oil pump is located in the sump, one set taking the oil from the passageways in the case casting itself to every point of lubrication, while the other set drains the used oil from the sump through a screen and delivers it back to the outside supply tank.

Ignition is taken care of by two Bosch magnetos placed one on either side of the engine, driven from the first idler gear, each one firing a set of plugs placed in the head and the carbureter of Miller multiple disk jet type is set on a short manifold of special design.



A layout of parts from the Miller engine. Note that the crankshaft and timing gears are suspended on ball bearings

For aeronautical purposes a two to one reduction gear of very simple construction is mounted on the crankcase, displacing the flywheel. This gear is designed to carry the propeller in direct line with the shaft with all parts mounted on ball bearings. A very large ball thrust takes care of all end strain from either direction making it possible to mount the engine without alteration in a plant of either the tractor or pusher type.



Aluminum plays a big part in the construction of the Miller engine. All pieces shown in this illustration are made from an alloy of that metal

TRAFFIC RULING NOT UNDERSTOOD

Chicago, April 23—A ruling which fixes a fine of from $5 to $200 for coming into or crossing a Chicago boulevard without first bringing the vehicle to a full stop was put on the statute book of the city last January and arrests are just beginning to be made for violations. Judge Kearns, who just now is presiding in the Speeders' Court, is inclined to be lenient with offenders as he says the ruling was made at the behest of the park commissioners, who regulate boulevard traffic, and that the ruling is not generally known. It appears to be a well-devised rule and should make for greater safety of travel, but it should be made clear to the motoring public before wholesale arrests are made as was the case a week ago Sunday.

2032 CADILLACS IN MARCH

Detroit, April 20—The Cadillac Motor Car Co. produced 2032 eight-cylinder Cadillacs in March.

TEN DETROIT CARS IN RUN

Detroit, April 20—Detroit will have a team of ten cars in the intercity reliability run from Buffalo in July. W. S. Gilbreath, manager of the Detroit Automobile club, has received the entries of six drivers and has applications for many more.

Two-Cycle Engine Which Idles

Williams Design Employs Pneumatic Valve for Handling Gases

SOMETHING radically new in motor car engines has recently been developed at Waukegan, Ill., the engine taking the name of a two-cycle, fuel-injection type. This engine, the Williams, follows conventional two-cycle design in that the piston covers and uncovers an exhaust port in the cylinder wall. Pure air is drawn into the crankcase and there compressed and forced into the combustion chamber; but it differs from ordinary practice in that the liquid gasoline is pumped into the combustion chamber where it mixes with the pure air coming under pressure from the crankcase. It could not be classified as a Diesel fuel-injection type, because in a Diesel engine the charge is exploded without a spark plug, the higher compression in the combustion chamber igniting the charge. The Williams engine does not use such high compression but fits conventional spark plugs.

As a result of this combination of two-cycle principles with fuel-injection principles the Williams engine will throttle to 100 r.p.m. Regular firing at low crankshaft speeds was one of the difficulties with two-cycle engines when used in motor cars, and because of its ability to idle at such low speeds the Williams engine is claimed to be suitable not only for motor car and motor truck work but also for aviation and marine.

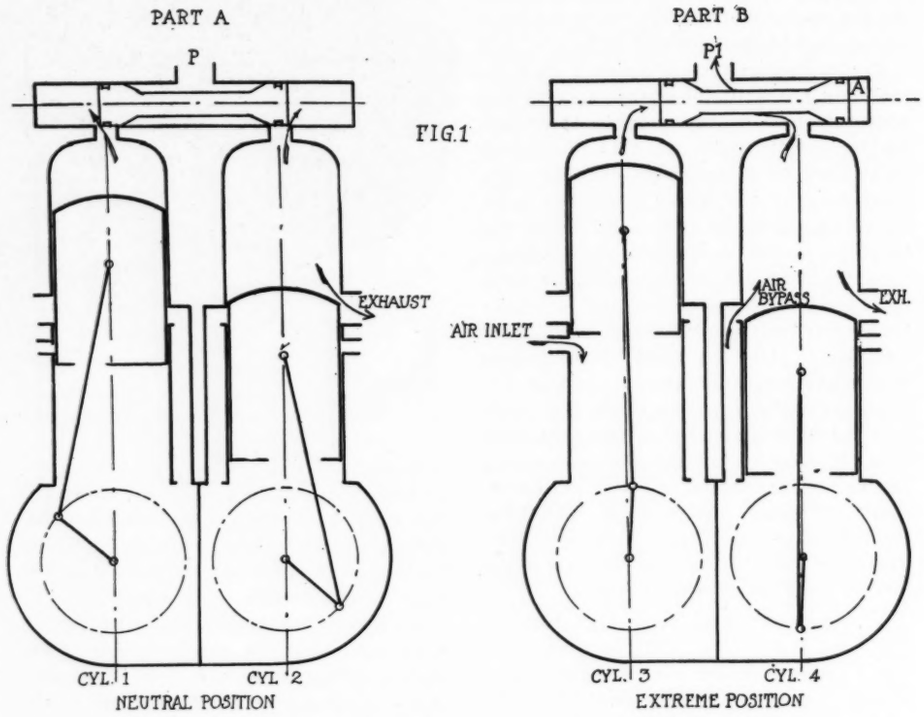


FIG. 1

Diagrammatic sketches to show operation of Williams engine. Scavenging at slow speed is performed through a main exhaust at the bottom of the stroke and an auxiliary exhaust at the top of the stroke. The ingress of compressed air assists this

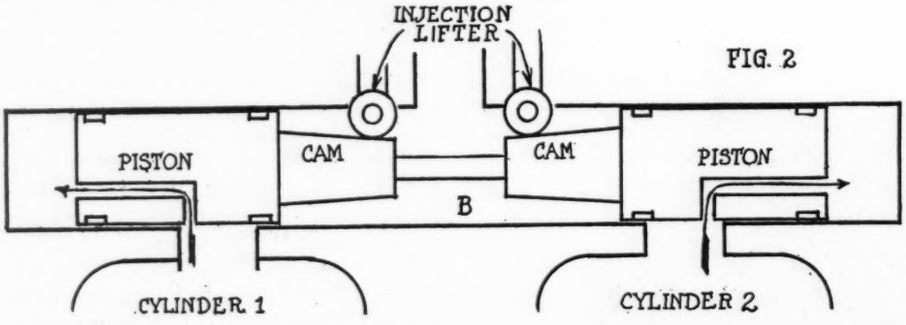


FIG. 2

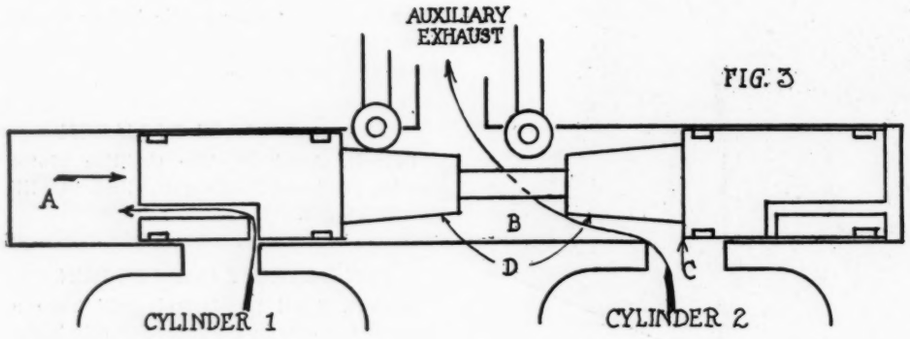


FIG. 3

Showing the pneumatic valve in neutral and in extreme position. This is actuated by compression from a pair of cylinders. The auxiliary exhaust is the throttle in that it regulates the length of the stroke of the pneumatic valve and thus the length of the stroke of the fuel injectors which are operated by the cams D

Pumping of the liquid fuel into the combustion chambers is obtained without any gears or other mechanical means. It is done by a double piston valve which lies horizontally over the top of two cylinders, one valve unit doing for two cylinders. This valve slides back and forth due to the compression and exhausting in the cylinders. When one cylinder is compressing the valve is moved in one direction and when the other cylinder of the pair is compressing it is moved in the opposite direction.

Before explaining in detail the exact scheme of valve operation, look at Fig. 1, which is a diagrammatic illustration of two cylinders in the Williams engine. The exhaust port is shown uncovered by the piston being at the bottom of the stroke in the cylinder at the right in each group. There is also an auxiliary exhaust through the valve in the cylinder head as indicated in Part B at P 1.

The left cylinder in Part B shows pure air entering a port at the left side of cylinder 3 while the piston is at the top and so entering the crankcase, where it is compressed and thence bypassed up the side of the cylinder to the combustion chamber as in cylinder 4.

Look next at the single reciprocating valve in the top of each cylinder pair. The valve resembles two pistons joined together by a rod. This double valve slides back and forth by air-pressure conditions and as it moves back and forth it operates a couple of gasoline pumps which in turn inject the gasoline into the cylinders. The position of these pumps is indicated in Fig. 2.

Fig. 2 shows more clearly how the sliding valve pumps the gasoline. As a part of the valve pistons are the cams as shown. These cams are tapered, and when the valve makes a stroke one of the tapers causes a roller to lift and this roller operates the pulsometer fuel injector, which is shown in Fig. 4. This will be explained more fully later.

On the conventional four-cycle engine, exhaust will open shortly before bottom dead center and remain open until top center for over 200 deg. crank travel. The burned gases are driven out so that, roughly speaking, only a volume equal to the compression space remains, and really, due to the inertia of the gases, even less.

On the conventional two-cycle engine, the exhaust ports open before bottom center and remain open to an equal distance after bottom center so that a volume of burned gas equal to the compression space plus three-fourths of the stroke remains. This being mixed with the new charge gives a low-grade mixture which is especially noticeable when throttling down and this is the reason why conventional two-cycle engines will not idle properly.

How Williams Idles

It is the automatic piston valve in the Williams engine which obviates this trouble. The valve is operated by the pressures existing in the two cylinders, which are connected together by cranks which are 180 deg. apart. The tops of the two cylinders are connected by means of an auxiliary cylinder in which floats the pneumatic piston valve. This valve is moved alternately by the compression pressure of the two cylinders as stated.

Between 50 and 60 deg. before the bottom dead center, the right cylinder has the same pressure as the left cylinder which is at 120 to 130 deg. after bottom center. Therefore the pneumatic valve is in what might be called a neutral position. See Part A, Fig. 1. The left cylinder, increasing in pressure, will start to drive the pneumatic valve toward the right, thereby closing up the port in the right cylinder, which incases fuel gases in compression space A as shown in Fig. 1, Part B.

The more the pressure in the right cylinder increases, the more the pneumatic will work to the right, thereby increasing the incased pressure in A, the tendency being to keep both sides of equal pressure and the result is that the gas chamber, which has the least pressure, forms a pneumatic stop for the valve.

The extreme end of the stroke of the piston valve will be at the time of maximum explosion pressure, roughly speaking about 10 to 15 deg. after top center. Then the pressure decreases and the gases in the pneumatic cushion expand, thereby moving the piston valve back until the pressure on both sides is equal again. After this the same operation is repeated.

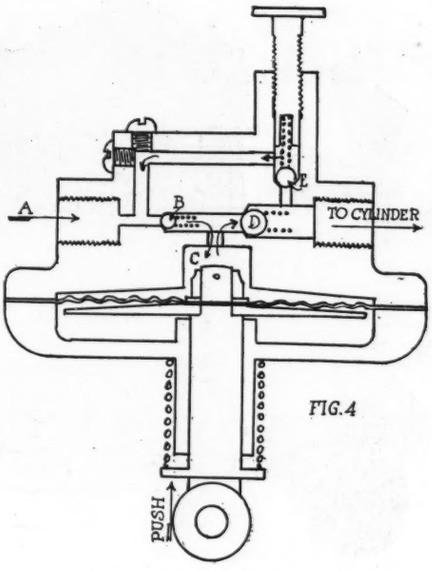


FIG. 4

The pulsometer fuel injector. Gasoline enters at A. On the downstroke of the diaphragm check valve B opens, drawing fuel into chamber C. On the upstroke of the diaphragm the gasoline in chamber C is expelled through check valve D and thence to the cylinder. Surplus fuel is bypassed through check valve E, which has a spring tension adjustment controlled by the thumb screw

If the port were to be left as wide open as the sketch in Fig. 1 shows, the speed of the pneumatic piston would be so great that the pneumatic cushion would not stop it, since some of the gas in the pneumatic cushion would escape through the big opening. To obviate this the gases pass through the small holes indicated in Fig. 2 by the arrows, and the gas can only communicate from the cylinder to the pneumatic chamber through these small holes where resistance is offered to the gases against their returning to the cylinder and a small amount of gas is taken to drive the piston. The speed of the gas through these small holes has increased to such great proportions that no carbon can deposit in them.

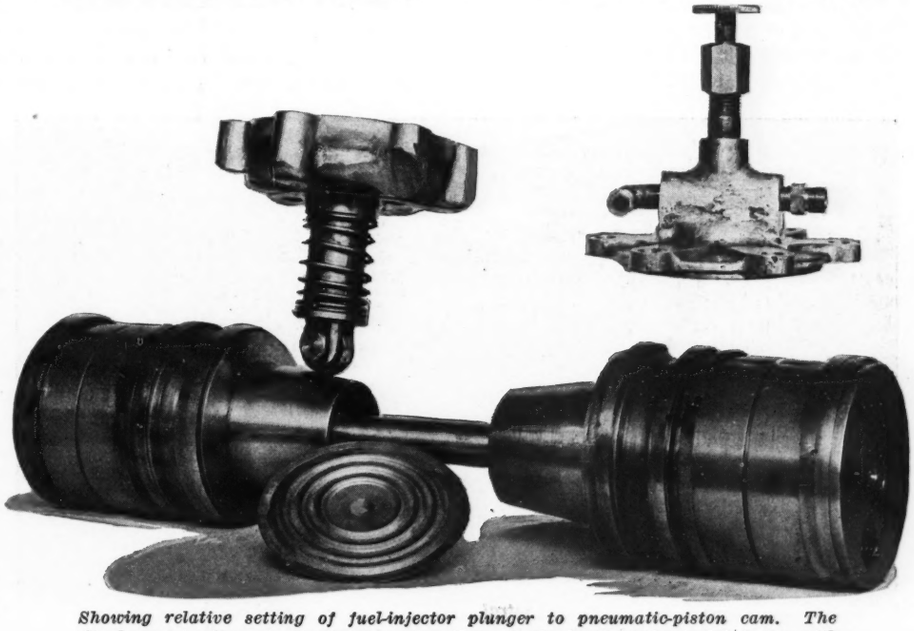
Furthermore, deposit of carbon in the pneumatic compression space is impossible as this pneumatic chamber is never exposed to the cylinder directly during the explosion time. As this pneumatic chamber can never have any carbon deposit, its volume cannot be changed, therefore the speed or length of stroke of the pneumatic valve is constant.

Throttling Down

The space B as shown in Fig. 3 will contain gases coming from the cylinder and those gases can, if one desires to throttle down, be let out through an auxiliary exhaust valve when the point C is over the port; the period ranging from 50 to 60 deg. before bottom center until 120 to 130 deg. after bottom center. The gas can be let out to any amount desired during that time, thus throttling the engine by reducing the piston valve travel. After that time the neutral position is reached again and the two ports are closed.

At the conclusion of this operation the fuel is thrown in. There is a pair of cams built as shoulders to the two ends of the pneumatic piston, as shown in Fig. 3. Inasmuch as the piston floats and thus can oscillate these circular-tapered cams present a very large wearing surface to the rollers which they operate.

The roller operates a diaphragm which will be described later. As at low speed



Showing relative setting of fuel-injector plunger to pneumatic-piston cam. The diaphragm is shown in the foreground. Above is the head of the fuel injector with the thumb-screw gasoline adjustment

the maximum pressure of the engine is lower, the stroke of the pneumatic is bound to be shorter and through this the lift of the fuel injectors, which are the diaphragms, will be smaller, giving a smaller amount of gasoline to be injected into the cylinders.

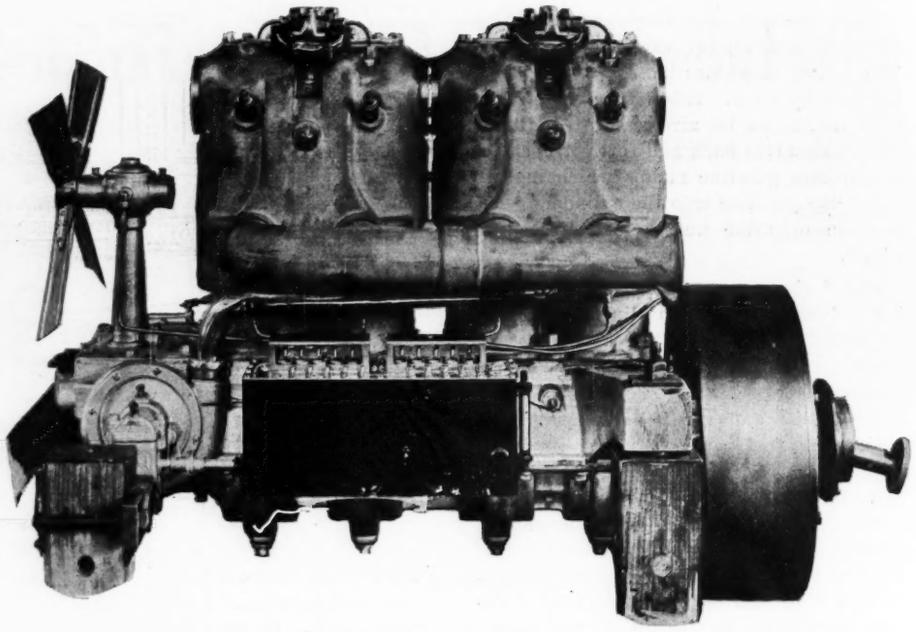
The injector is of the pulsometer principle, the gasoline getting into the injector through A in Fig. 4, passing the check valve B and entering chamber C. Then, through the movement of the diaphragm in the direction indicated, it will increase the pressure on the fuel and drive it through the check valve D to the cylinder. The amount of fuel supplied is regulated by the area of the diaphragm and the length of its stroke. The pressure can be regulated by changing the tension on spring E and any over amount of pressure will be sent back to the inlet through the bypass above E. As there is no movable packing such as a plunger would require this arrangement has little to get out of order or wear out.

Few Working Parts

In comparison with the four-cycle type of engine, it can be seen readily that there are few working parts. It eliminates the need of poppets, springs, lifters, camshafts and all complications of the crankcase through the camshaft and its gears. In the Williams block the pneumatic valve-carrying cylinder is cast integral with the block and its machining requires a boring sweep only. The ends of the compression spaces on each end of the pneumatic piston are sealed by caps which are bolted direct to the casting.

For removal and inspection of the valve the work necessary is simple. The entire fuel injector may be pulled out by removing several cap screws. Then the caps on the end of the pneumatic cylinder may be quickly removed and the valve pushed out.

Preparations are under way for initial production of marine engines in the factory of the Williams Motors Co., Waukegan, Ill. The manufacture will be of a broader scope later, including the construction of aviation and motor car engines. Experimental work has been going on in the present factory for nearly a year. Present plans call for the construction of a moderate size four-cylinder marine engine and a twelve-cylinder 800 hp. marine engine.



Williams head on an Amplex engine. It is to be noted that the fuel injectors are set opposite each other and at an angle, to fit this design. In regular practice the injectors will be located as shown in the diagrams, Figs. 2 and 3

METZ PRICE $650

Waltham, Mass., April 23—Special telegram—All the Metz passenger cars for this year are to be equipped with Westinghouse starting and lighting equipment together with Atwater Kent ignition system, and the new price is $650.

DOBLE PRICE ANNOUNCED

Chicago, April 20—The price of the Doble steam touring car and three-passenger roadster will be $2,500, it is announced. The prices of other models will be announced about the first of June.

NEW MACK TRUCK PRICES

Chicago, April 23—Effective immediately, prices of Mack trucks will be as follows: 1-ton, $2,250, a raise of $100; 1½-ton, $2,700, a raise of $200; 2-ton, $290, a raise of $100; 3½-ton, $3,750, a raise of $100; 5½-ton, $4,500, a raise of $250, and 7½-ton, $4,800, a raise of $200.

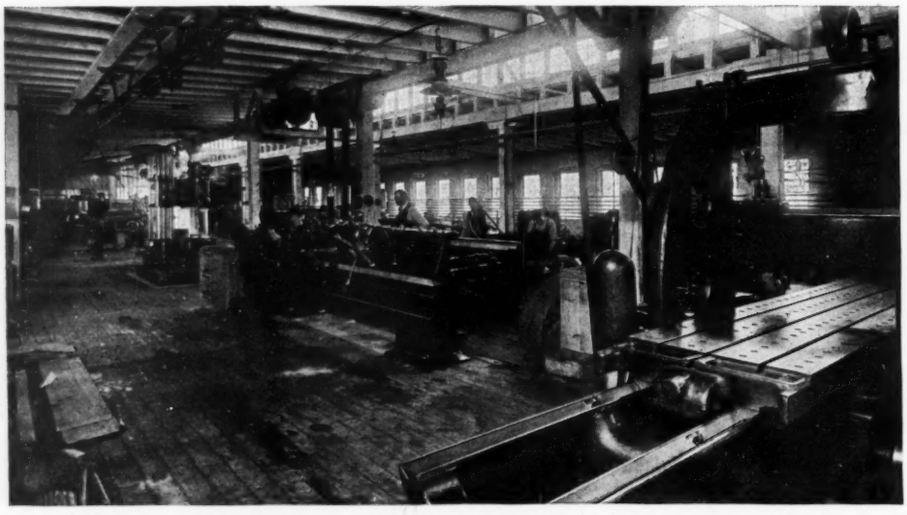
MAXFER MOVES TO HARVEY

Chicago, April 20—The Maxfer Truck & Tractor Co. has outgrown its present quarters in Chicago and is moving to Harvey, Ill. It will occupy the former plant of the Packless Valve Co., which will be equal to double the capacity of its present plant and in addition will have better railroad facilities, since this new plant is adjacent to the Baltimore & Ohio and Belt line railroads.

C. R. Strong, formerly production manager for the Ford Motor Co., at Chicago, has joined the Maxfer company as production manager.

DOUBLE JEFFERSON SOCIABILITY

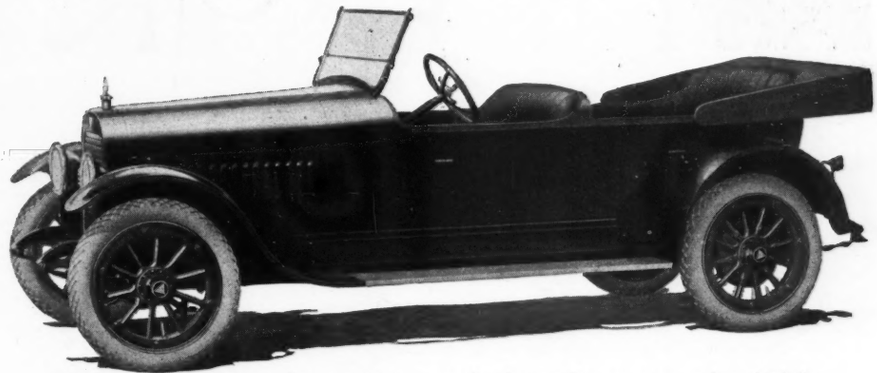
Des Moines, Iowa, April 23—Officials and representatives of the Jefferson highway will conduct a double sociability run from Winnipeg to New Orleans and return this spring. The start will be made from the Canadian terminal May 14, and New Orleans will be reached March 31, according to schedule. June 5 the return trip will be begun, terminating at Winnipeg, June 29. There will be a directors' meeting in St. Paul in June. During the runs speeches will be made from the cars. As soon as one speaker has finished his car will move on and another take his place. A rigorous schedule has been mapped out and the procession will be moving all the time.



Machine shop of the Williams Motor Co., factory, showing that constructional work is already under way

Hudson Brings Out a Super-Six Speedster

Willys-Knight Staggered-Door Sedan



The new Hudson speedster, which uses the Super-Six engine and a slightly altered chassis

A FAST, rakish appearing speedster is offered by the Hudson Motor Car Co., Detroit. It of course uses the Super-Six engine. A glance at the photograph will demonstrate that the lines typify speed and power. As a further step toward distinction the body is finished in Cobalt blue with vermilion wheels. The wheels are 32 by 4½, smaller than the standard Super-Six phaeton wheels. The body edges are beveled and finished in black.

The engine is the same, although some slight changes have been made in the chassis, notably a lower steering wheel and a new control set. The wheelbase is the same as that of the phaeton, but the general lines of the speedster give it the appearance of greater length.

200 lb. Lighter

It is approximately 200 lb. lighter than the standard touring car. The seats are long and roomy and give the car a four-passenger capacity. Instead of a rail foot rest in the rear compartment the speedster has a foot rest of triangle form, which is removable. The doors are wide with hinges and handles on the outside.

A few of the body dimensions are as follows:

Distance dash to front seat cushion, 30½ in.; height of front seat cushion above floor, 10½ in.; height of steering wheel above seat cushion, 7 in.; distance between steering wheel and seatback, 15 7/16 in.; height of front seat back above cushion, 13½ in.; diameter of steering wheel, 17⅝ in.; distance from back of front seat to front of rear seat, 28½ in.; height of rear seat above floor, 14¼ in.; height of rear seat back above cushion, 12½ in.; width of front doors, 23 in.; width of rear doors, 18½ in.; height of body, 19¾ in.; sill length, 101 7/16 in.; length overall, 107⅞ in.; width of front and rear seat cushions, 41 in.; width overall of body at widest point, 49½ in.

P.-F. HEARING IN JUNE

New York, April 20—The infringement suit of the Perlman Rim Corp. against the Firestone Tire and Rubber Co. will come up for final hearing on the first Monday in June. In view of the early date of the trial the court has denied the petition for a preliminary injunction. The suit was brought in February and charges infringement of the Perlman demountable rim patent No. 1,052,270, which achieved its chief prominence last year when the U. S. circuit court of appeals in this city declared the patent valid and infringed by the Standard Welding Co.

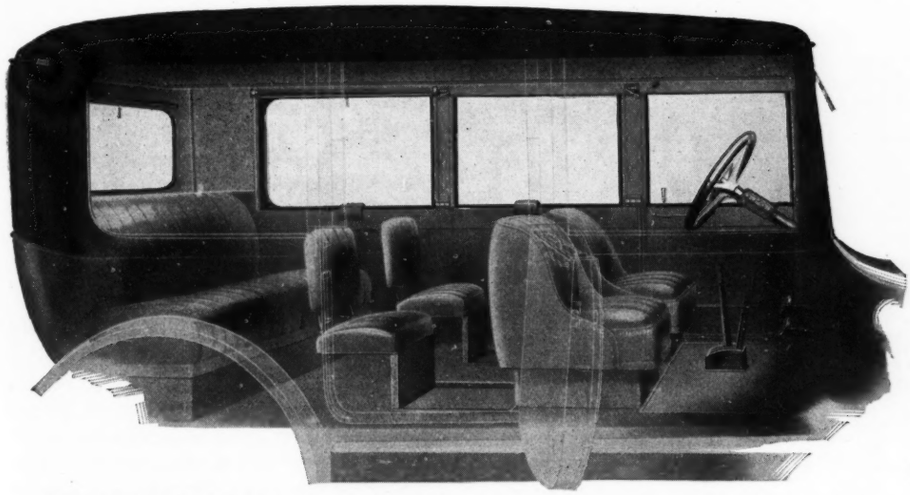
CORRECTIONS

In the description in the accessory department of the April 12 issue of MOTOR AGE of the Simplex engine governor manufactured by the Duplex Engine Governor Co., Inc., Brooklyn, N. Y., the statement was made that this governor was applicable to engines ranging in size from 150 cu. in. to 100 cu. in. This should have read from 150 cu. in. to 1000 cu. in.

Due to misplacement of lines in the description of the Detroit Cartridge lock, marketed by the Wallace C. Hood Service Bureau, Detroit, the impression was conveyed that the price was 80 cents and that distribution was handled by a Chicago concern. The price is $5 and all distribution is handled from the Detroit office.

TEXAS REGULATES REPAIRS

Austin, Tex., April 20—The legislature has passed a bill requiring the registration of all repairs and other work done on motor cars. The registration is to contain a complete description of the car, including the make, number of cylinders, model, passenger capacity and engine number, as well as the name of the owner, his county and state register numbers and his place of residence. The register is to be open to the public. Failure to comply with the legislation is a dismeanor, and the penalty is a fine of not less than $25 or more than $100 for the first offense and not less than $50 or more than $200 for each succeeding offense, or imprisonment for not more than six months, or both.



The Willys-Overland four sedan with staggered door arrangement, one door for passengers and one for driver

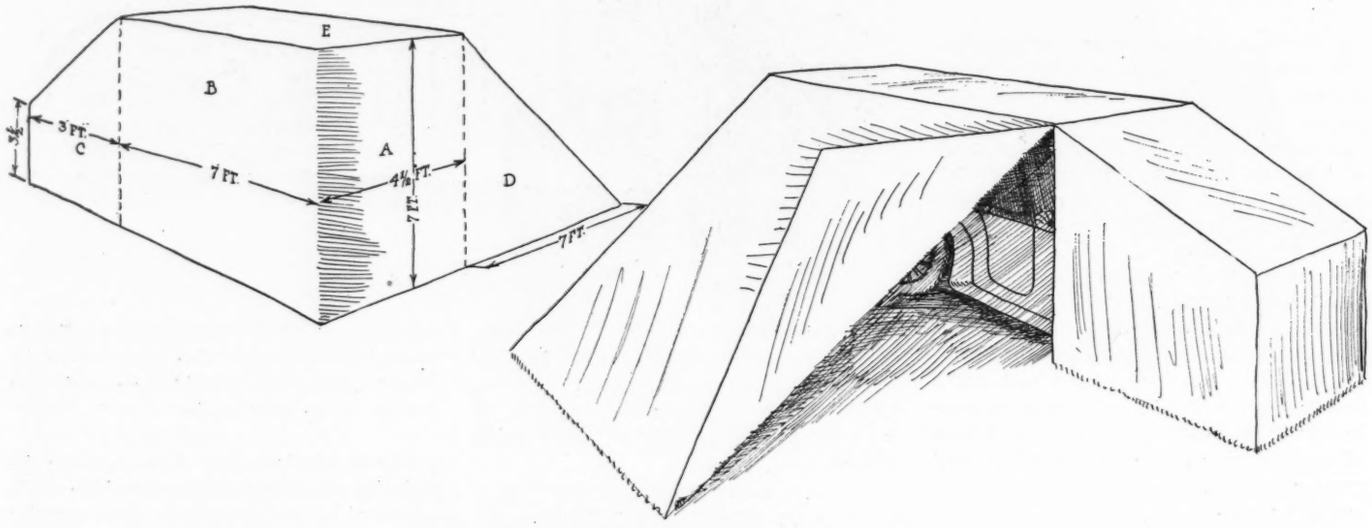
WILLYS-KNIGHT SEDAN

The Willys-Overland Co., Toledo, Ohio, is now building a staggered-door type of convertible sedan body on its Willys-Knight four chassis. The doors in this type of body are placed so that the entrance for the passengers is located in the middle of the car on the right side, giving the passengers an unobstructed passageway to their seats.

The driver's door, however, is at the front of the body on the left side, so that he interferes with no one when he enters or leaves the car.

Up to the time of the introduction of this type of body the convertible sedans were equipped with doors in each side on the middle of the car.

The Motor Car Repair Shop



Figs. 1 and 2 showing tent dimensions and method of opening

Tent Costs $10 for Material and Labor

THE little cross-country motor trips that so many of us enjoy yearly are appreciated much more if they include a night or two that can be spent in the open in true outing style.

When the skies are clear, nothing is necessary for the night's stop save enough bedding to keep off the chill. But to be on the safe side, a tent of some sort should be included.

Tents there are of all kinds, but one that will include the car and yet be small enough for all practical purposes has not as yet been made on any commercial basis. The ordinary square, gable-roofed tent is of such shape that, were it purchased large enough to accommodate the car also, it would require a tow-cart to carry it.

Another Variety Offered

There is also another variety that might be used for this purpose, that of the single-slope roof tent. But even this kind must be much larger than it might be were it of different shape.

The accompanying illustrations show a tent which is made especially to fit over the car. Made of light weight duck, it does not take up much room and yet when set up, not only includes all of the car, but provides for ample space at one side for beds and what tent room is commonly used for.

Where it is inconvenient for one to cut and assemble the sections himself, the work may be done at a harness shop or by a seamstress for $2 or less.

Material quite suitable for a tent of this kind is 8 oz. duck, which may be purchased in convenient 36-in. widths. This usually retails at 20 cents per yard, but may be bought a little cheaper from some houses. The covering herein considered would require approximately 32 yd., which would total $6.50 for the canvas, but many cars could be accommodated in a smaller tent. At any rate, with the work all hired, the cost of the completed cover would come well within the $10 mark.

Note that the dimensions are somewhat general and the pieces dimensioned, when assembled, would make a cover that would accommodate a large car, but the dimensions may be readily decreased.

Fig. 1 shows the front, right-hand side view of the tent cover in place. The flap thrown back on the tent fills the opening below when there is a need for it. It may be readily laced to the adjacent side, making a snug tight tent all around. The bottom of the tent is staked down also.

The following list gives the dimensions required as shown in Fig. 2:

	Ft.
A	31.5
B	49
C	15.75
D	24.5
E	31.5
H	15.75
I	56
K	20.25
D′	24.5
C′	15.75

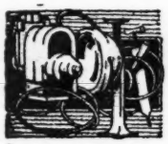
Total, 284.5 ft. or 32 yd., approximately. At 20 cents per yard, $6.40.

Do Not Overload Engine

The seeming epidemic for rebuilding touring cars and roadsters into speedsters has led many MOTOR AGE readers to inquire how they can best alter the engines for increased speed. It is all right to put on a magneto, new carbureter, aluminum pistons, etc., but the power of an engine should not be increased by increasing the force of the explosion by most of the ordinary means unless the life of the engine is expected to be decreased.

If the size of the combustion space is decreased, thus increasing the pressure, and hence the force of the explosion, the stress on the connecting rods, crankshaft, etc., is increased.

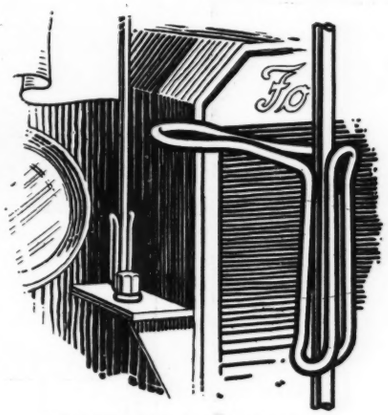
Many will wonder, after transforming the engine, why the bearings become loose in a short time and why the engine rattles generally. Although the design of an engine is such that extra loads may be carried by its internal parts, the longest service can be obtained only by operating the engine under the conditions called for by the construction.



The Accessory Corner

Flag and Pennant Holder

THE Seng flag and pennant holder can be attached to a bolt or nut on the radiator or lamp of the motor car and is a permanent fixture. It is a strong nickel steel spring fastener device that holds the flag in a rigid position. Price, 25 cents. Seng Auto Device Co., Chicago.



Flag and pennant holder for cars

Mirro-Like Body Polish

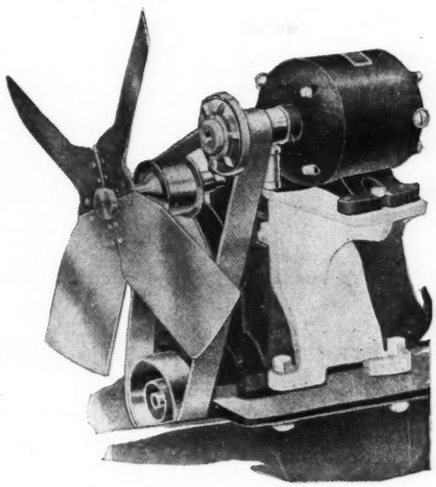
A new body polish is made by the Mirrolike Mfg. Co., Long Island City, N. Y., under the name Mirro-like. This is not sprayed on the car but is applied with cheesecloth, the manufacturer claiming that it imparts a brilliant, lasting hard finish to the car body and leather upholstery without leaving any oily residue. The compounding of various elements which have been used for years by piano manufacturers in refinishing piano cases insures finish-restoring qualities for the polish, which is sold in half-pint cans as samples and in pint, quart and gallon cans for regular use. Price, $1 a quart and $3 a gallon.

Kerosene System for Ford

The K. B. C. system for Ford cars consists of a vaporizer and a carbureter. The vaporizer has no moving parts, and all moving parts of the carbureter are positive of action. Two hours are required for installation. All adjustments are automatic except one, the needle valve, which, it is claimed, can be adjusted in 1 min. The carbureter has two bowls, one for gasoline and one for kerosene. The car starts on gasoline and changes to kerosene. The change is made by the throttle lever, half the segment being for gasoline, the other half for kerosene. Kerosene is carried in the present gasoline tank, while the gasoline occupies a small auxiliary tank. If the car is not allowed to stand until too cool, it can be started on kerosene, it is said. The system includes the auxiliary tank, 1¼ gal.; carbureter, 1 in. size; vaporizer manifold; copper pipe, ¼ in., to connect tanks; necessary gaskets; and steering wheel connections. Price, $40, with an introductory offer of $7.50 for the old carbureter and manifold, making the net price $32.50. Kerosene Burning Carburetor Co., Detroit.

National Electric Lighting Systems

The National electric system for Ford cars includes a suitable bracket with bolts, an automatic cut-out, leather belt and pulley for each generator and can be installed by the average person in less than 2 hrs., it is claimed. To attach, two bolts are replaced with the longer bolts of the bracket, and the generator is mounted in the right side of the engine. With a few changes the present system of wiring is used. If the car has a good storage battery the only part needed is the generator and its equipment, $30. The dash ammeter costs $3, and if the equipment is standard Ford only, a Willard storage battery, $14, is required. The complete system, generator, pulley, bracket, cut-out, leather belt, storage battery and ammeter, is $40. National Electric Lighting Co., Wilton Junction, Iowa.



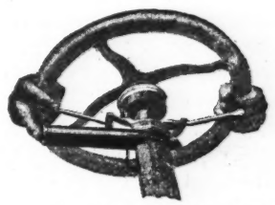
Electric lighting system for Ford cars

Transfer Flags for Windshields

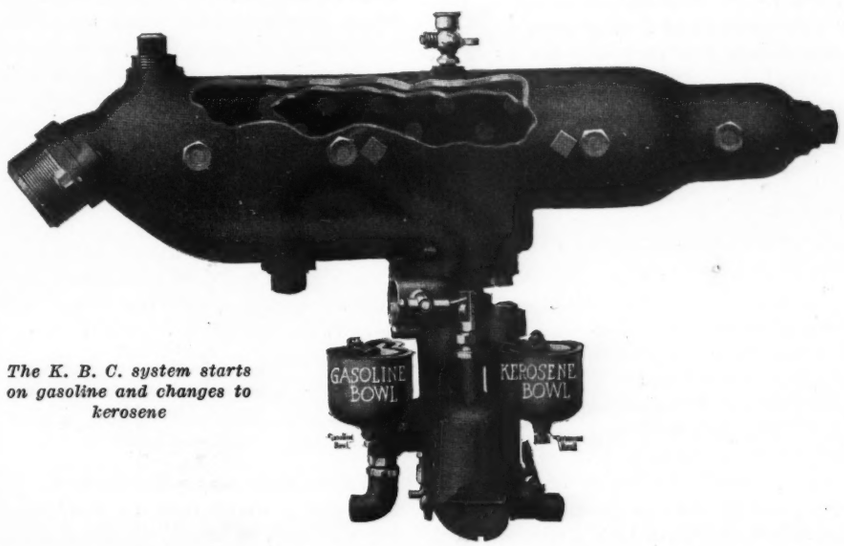
In keeping with the spirit of the times a concern is making United States flags in Decalcomania transfer form which can be applied to the windshields of cars. Meyercord Co., Chicago.

Seng Horn Button for Ford

The Seng horn button can be installed quickly below the steering wheel on the steering post. The black enamel projector incloses the wiring and brings the signal button out where it can be touched without removing the hand from the wheel. To attach, it is only necessary to tighten one screw and connect the wiring from the switch to the wire on the old button. Price, $1.25. Seng Auto Device Co., Chicago.

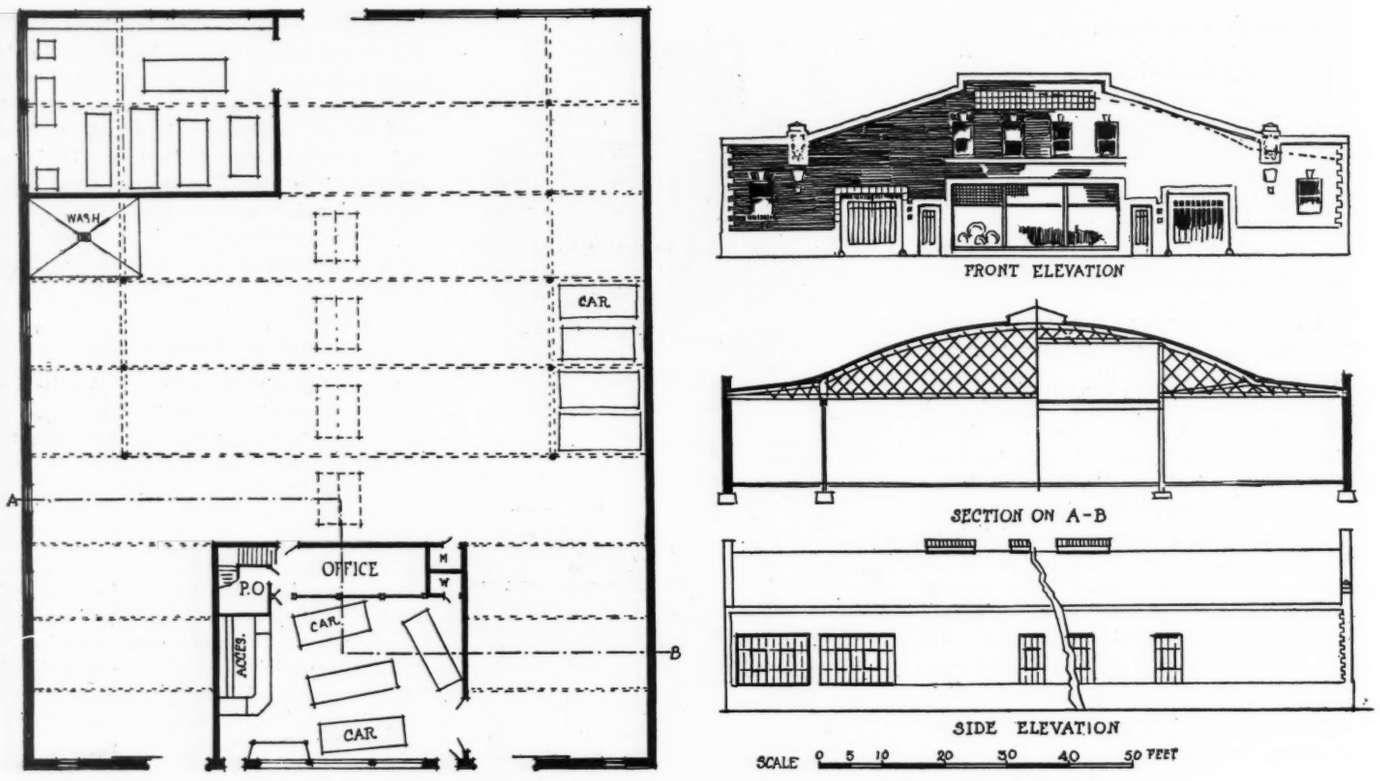


A horn button that is always within easy reach



The K. B. C. system starts on gasoline and changes to kerosene

The Readers' Clearing House



Plans for Fifty-Car Garage 100 by 120 Ft.

CANON CITY, Colo.—Editor MOTOR AGE—We are going to build a garage. We want the most modern ideas of construction in a sketch and description. Following are the specifications: Cost, $10,000 to $15,000; height, one story; face on main street, 100 ft.; face on side street, 120 ft.; display room to hold four or five cars, office, stock room, wash rack, repair shop to hold five cars. What would be the most attractive front material, white preferred?—Royal Gorge Motor Co.

See above. This garage as planned will provide storage room for more than fifty cars, a repair shop capable of taking care of four or five and a show room that will accommodate four cars with one displayed in the window.

The office is at the rear of the show room with a small private office in the corner behind the accessory department. Above the office and show room section is a second floor or loft that will accommodate accessory stock and be a good light location for a vulcanizing room.

The row of posts at the sides and rear of the garage section is spaced so that two cars can be stored in each space and by using this space for storage exclusively the posts will not interfere with traffic in the least. The space between the rows of posts will, of course, have to be trussed and we have suggested the lattice truss as it is very generally used in garage construction and is less expensive than timber or steel, though the latter would make a job much less liable to fire hazards. A less expensive construction would employ posts throughout, eliminating trusses but cutting down the value of storage space.

Four skylights are suggested to aid in lighting the center, and if windows cannot be provided in the right hand wall two or three more skylights along that side would be advisable, as workmen cannot do as well where they are handicapped by darkness.

The front of this building is shown treated in white terra cotta and dark red or brown brick. By carrying the terra cotta about four feet up from grade, a beautiful white expanse will be obtained that will admit of cleaning and keeping neat without great expense.

If the terra cotta proves too expensive, white or cream enamel brick might be substituted, or even a smooth cream colored face brick used with a few cream colored terra cotta ornaments to relieve it.

FORD OWNERS DO YOU KNOW THAT

A Knock You Blame to Bearings May Be Dirty Plug?

Walnut, Ill.—Editor MOTOR AGE—Sometime ago I wrote that my Ford gave a big vibration at times; at other times it ran perfect. I stated that evidently the magneto was set too close and asked if that would affect the ignition and lights. You asked me what I found. ANSWER:

The magneto was not perfectly true and one magnet hit a little on three of the balls, I don't know what their name is. In setting it apart I set it back $\frac{1}{32}$ in. fearing it might hit again. There was no change in the lighting that I could detect, but that same vibration was still there. I decided to go thoroughly over the entire engine and at the same time lap in over-size pistons to stop one from oiling up and keep the engine quiet for a longer period. As I had just gone over the gearset and the main bearings were perfect, I took out the pistons without removing the cylinder block and there the vibration cause was apparent. One of the bearings on a wrist pin was so loose that it worked out against the cylinder wall and showed where considerable of the end had been worn off. At times evidently it would work into its proper place and cause no trouble.

Now I note that on page 40 of the March 1 issue you say the piston cannot be fitted without taking the block off. Why? I lapped in these .0025 pistons, of course, fully protecting the main bearings, and to date the job seems so perfect that I have

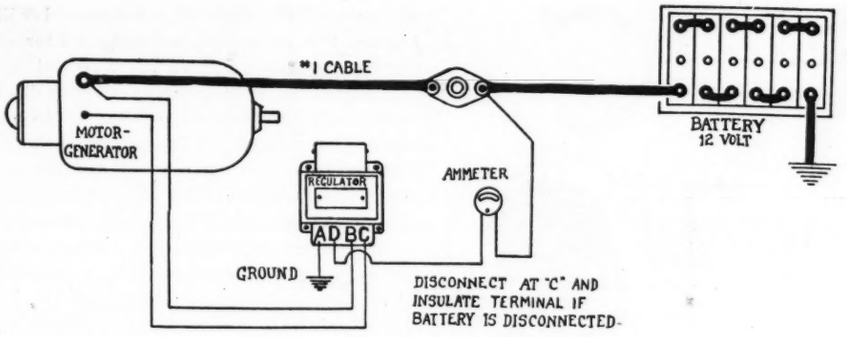


Fig. 1—Wiring diagram of Disco system as used on Elco 30

put a whole set of new pistons in another car and fixed one oily one in the same manner. As soon as the piston would force into the cylinder, I used only the finest compounds I could get and fitted them so close that unless wet with fine oil they would not go in at all. Yet they were so smooth that I could crank the finished job after oiling the top through spark-plug holes.

When starting out I put in 2 qts. of oil above the top cock and ran slowly a while on jacks. I let it rest until cool and gave it a little more. These machines did not run good the first 20 miles and this is no way to fix a racer; you must go slow at first, but for my own satisfaction I looked to see if any cylinders scored or if any oil worked up. The cylinders kept perfect and car No. 1 never oiled a bit. Car No. 2 oiled a little the first two days' run, but is perfect now. For years I watched bearings for rattles, tried to keep my car quiet and cannot help but comment that in two cases out of three the effect and not the cause gets the attention. Many times have I seen connecting rod bearings tightened when there was only the symptom of poor ignition, carbon, or oiled spark plug. That dirty plug has fooled a lot of people, causing not a mis-fire but a lag and jar that would jerk a perfect connected crank on a Ford. I have come to the conclusion that rattle commences where power is born. First, spark, but more specially a perfect mixture of gas. Then the first place I would suspect is a piston slap and on down as power is transmitted. I was surprised at the difference the Wilmo manifold produced in making a smooth running engine. If a piston gets to slapping, well, it is a bad habit and hard to locate for sure, but pistons are cheap as compared with accessories. If all else is right, connecting rods on their original pistons have got to be mighty loose to rattle. I never saw main bearings noisy.—W. F. Black.

Inquiries Received and Communications Answered

Royal Gorge Motor Co.	Canyon City, Colo.
W. F. Black	Walnut, Ill.
Joe Strohwig	Holton, Kan.
E. W. Zwiebel	Burlington, Wis.
W. R. Walker	Springfield, Ill.
Sharp Transfer Co.	Corinth, Miss.
C. J. Ludewig	Pittsfield, Wis.
Cecil C. Camp	Texas City, Ill.
E. Sims	Floydada, Tex.
C. D. Jamison	Weldon, Iowa
C. D. Truitt	Victoria, Tex.
W. A. Thomas	Columbus, Neb.
Constant Reader	Flint, Mich.
H. A. Gerberding	LaGrange, Ind.
A Subscriber	Ogallala, Neb.
A Reader	Canton, Ohio
J. L. Rains	Buffalo, N. Y.
James J. Costa	Anthony, Kan.
Reader	Toledo, Ohio
Hal S. Miller	Springfield, Mo.
A Reader	Milwauke, Wis.
John L. Clowes	Manzanola, Colo.
Carl Kroger	Souris, N. D.

Maker of Elco

Holton, Kan.—Editor MOTOR AGE—Who manufactured the Elco 30 in 1916 and who is its present manufacturer?

2—What make of engine does it use?

3—Give me wiring diagram of the Disco system as used on the Elco 30 in 1916.

4—What is the gear ratio on this car?

5—Does the manufacturer of the Elco 30 manufacture any other cars?—Joe Strohwig.

1—Bimel Automobile Co., Sidney, Ohio.

2—Rutenber.

3—The wiring diagram is published in Fig. 1.

4—The gear ratio is 3.91 to 1.

5—The Bimel Automobile Co. also manufactures a six-cylinder car with a Rutenber engine known as the model 25 with 3⅛ bore and 5-in. stroke which, at the present time, sells for $1,150.

Rebuilds Saxon Four

Burlington, Wis.—Editor MOTOR AGE—In Fig. 2 are photographs of my rebuilt Saxon four. The chassis is the original Saxon and the only changes in the engine are the addition of a 1-in. Rayfield carbureter, new ignition and different timing. This car weighs but a little over 1000 lb. and is capable of better than 55 m.p.h. The body was designed and built by myself. If any reader should want further information he may write me direct.—E. W. Zwiebel.

Chalmers Valve Timing

Springfield, Ill.—Editor MOTOR AGE—Give correct timing of valves of Chalmers engine, Model 19-1914.—W. R. Walker.

Valve timing of models 17 and 19 is as follows: Inlet valve opens 16 deg. or 2 in. late on flywheel. Inlet valve closes 33 deg. or $4\frac{7}{64}$ in. late on flywheel. Exhaust opens 53 deg. 30 min. or $6\frac{31}{32}$ in. early. Exhaust closes 12 deg. or 1½ in. late on flywheel.

Maxwell Gears Slip Out

Corinth, Miss.—Editor MOTOR AGE—I am having trouble with a Maxwell town car, 25-1915 model. When I throw it in high gear and speed up to about 15 m.p.h. it will jump out of gear. The gears seem to be in good shape. We have also put on a new gear shift, but that doesn't seem to help. What is the matter?—Sharp Transfer Co.

Owing to the fact that this car has been in use probably two years it is possible the gearset gears have become worn or there may be too much end play in the clutch gear, also due to wear. It is also possible that the gear-shifter shaft plungers have worn or the spring has become weak allowing the plunger to slip out of the slots in the gear-shifter shaft.

Breaker-Point Adjustment

Pittsville, Wis.—Editor MOTOR AGE—How far should the breaker points on a Model 60 Overland magneto separate?

2—What company manufactured the rear axle on the 1913 Model 34 Imperial?—C. J. Ludewig.

1—Remy magnetos were used in connection with model 60 engines and if your engine is still Remy equipped, a clearance of .025 in. should be allowed between the points with the magneto breaker cam at its

Fig. 2—Zwiebel's rebuilt Saxon four capable of traveling 55 m.p.h.

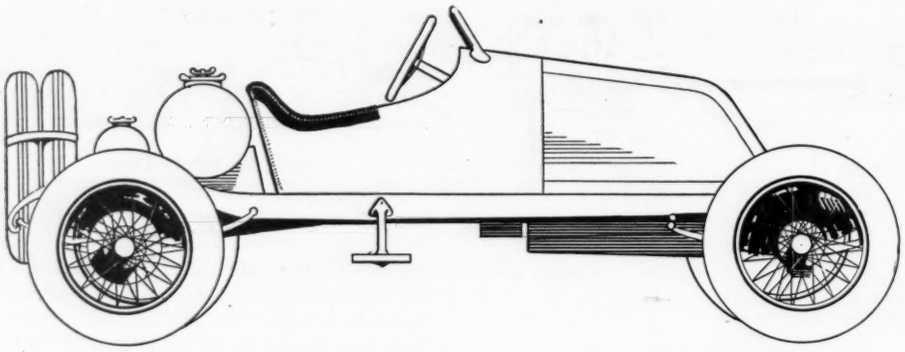


Fig. 3—Hybrid car combining Mercer chassis and Franklin engine with special body using Franklin-type hood

highest position. Should spark knock occur with the points in this position, it perhaps would be well to reduce this clearance to approximately .020 in. However, this range should be within the limits of .020 to .025 in.

2—Salisbury Wheel & Mfg. Co., Jamestown, N. Y.

D. C. MOTOR INTO A GENERATOR

Directions for Converting Electrical Machine Given

Texas City, Ill.—Editor MOTOR AGE—Referring to an article in the March 15 issue by David Penn Moreton, would like information in regard to a small direct current motor. This machine has been used in a signal system, using Edison primary batteries, as the power. The armature is about 3 by 3 in. The commutator has four brushes, or rather two pair of brushes on it, and it is about 1 in. in diameter; the brushes are of copper, laminated. The magnets are composed of laminated iron, so are non-magnetic when there is no current through the feed coils. They are divided at top and bottom by a wooden block and bound together with brass. The field coils measure about 2 by 2½ by 4 and the wire is either No. 14 or 16. There are four leads from the machine, two from the field coils and two from the brushes. I would like to use the above machine for a generator. What changes would I have to make for this? What voltage and amperage would it likely develop? How many lamps would it likely light?—Cecil C. Camp.

The first thing you must do in unwinding your generator is to get magnetization, which may be done as explained in the March 15 article. The magnetic circuit should, of course, be worked near, or a little above the "knee" of the magnetization curve which fixes the field strength of the machine. Now the voltage generated in the armature winding for this particular field strength will depend upon the speed at which the armature is revolved, assuming the brushes are in their proper position on the commutator. The speed of the machine may be adjusted so that it gives the desired voltage provided this speed is not beyond the safe limit at which the armature should be revolved. There is also a limit to the voltage the machine may be made to develop, which depends upon the number of commutator segments. The voltage between segments should not exceed 10 volts and difficulties may be encountered in commutation for voltage between segments much less than 10.

If the material composing the magnetic circuit is such that it will not retain sufficient magnetism so that the machine will build up as a self-excited generator, then a field current must be provided by means of a storage battery or other direct-current source of energy. The ampere turns required in the field winding will be equal to the product of the number of turns now in the field winding, and the current required to raise the magnetic field to a point a little above the knee of the magnetization curve. This field current may be excessive for the present number of turns and may be reduced by winding on more turns of smaller wire. The size wire and number of turns may be calculated as explained in the main article.

The current it is possible to take from the armature will depend upon the size of wire in the winding and which is more a matter of experiment than calculation.

TIMING OF OVERLAND MAGNETO

Flywheel Has Markings That Assist in Setting

Weldon, Iowa.—Editor MOTOR AGE—I have an Overland Model 69 T. 1913. How do you time the magneto on this model? It is a Remy model R. L.

2—When timing the magneto is No. 1 cylinder on dead center or past center on the firing stroke?

3—Should the platinum points commence to open just as the piston starts from upper dead center?

4—Has Schebler brought out its new model carbureter to handle the lower grade of gasoline yet?

5—In what order does an Overland Model 69 T. fire?—C. D. Jamison.

1—In order to time properly a Remy magneto in connection with a model 69 T Overland engine, first turn the engine until the pistons in No. 1 and No. 4 cylinders are in their uppermost position, namely top center, at which time examine the marking on the flywheel. The marks 1 and 4 on the top part of the face of the flywheel will be found in direct line with the center of the rear cylinder. Move the flywheel approximately ¾ in. beyond this upper dead center; that is in the direction in which the engine rotates. With the spark lever fully retarded, set the magneto on the engine base so that the breaker just begins to separate the platinum points. The distributor segment must make contact with the segments attached to No. 1 cylinder wire.

2—Explained in answer 1.

3—Explained in answer 1.

4—It is not yet ready for the market.

5—The engine fires 1, 3, 4, 2. In order to determine when No. 1 cylinder is in its firing position examine the push rods carefully. When turning the engine over to obtain top center of the pistons, examine the push rods in No. 1 cylinder. If both of them are free you can rest assured that that cylinder is in its firing position. However, should one of the push rods be tight, or the valve opened, turn the crankshaft one complete revolution.

Wants a Metz Speedster

Floydada, Texas.—Editor MOTOR AGE—I have a 1913 model Metz which I want to make into a speedster. Will you publish a rough sketch for it?

2—What speed could be gotten with this car?

3—Could a sliding gearset be put in this car and still use the chain drive? If so, tell me what kind and where manufactured.—E. Sims.

1—A sketch is published in Fig. 4. The design of this car requires that the seat be somewhat above the frame to allow clearance for the friction disk.

2—The speed possibilities would depend entirely on the condition of the car. There is no chance of giving a fair estimate when a car has been driven four years or more.

3—There is no sliding gear transmission especially adapted for this car. A special gearset with all necessary alterations would probably cost you $100 applied.

Mercer With Franklin Engine

Victoria, ex.—Editor MOTOR AGE—Show outline drawing of your conception of a classy air-cooled raceabout with the usual tanks and tire holders in rear on a Mercer 35H, 1914 chassis, with 6-cylinder Franklin engine, Westinghouse shock absorbers front and rear, and wire wheels, 34 by 4½.—C. D. Truitt.

The drawing you ask for is given in Fig. 3. The Franklin type of hood is used. If you are contemplating construction of such a car you must be prepared to lay

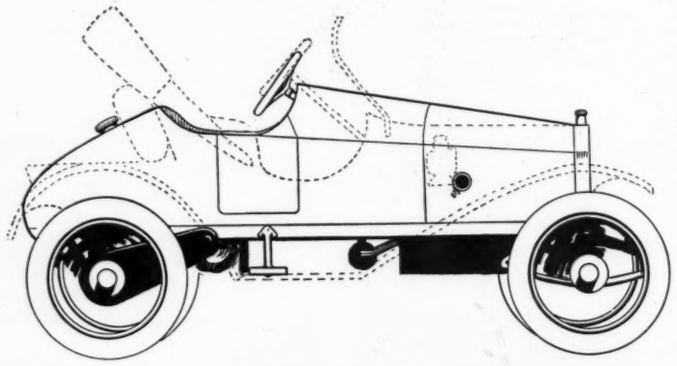


Fig. 4—Speedster body which could be applied to a 1913 Metz friction-drive car

out a considerable amount of money, possibly more than you realize. The Franklin engine is not at all adapted for the Mercer chassis and would require a complete new mounting, with the necessary alterations in the transmission units behind the engine.

RECONSTRUCTED CHALMERS SIX-40

Cannot Buy Ready-Made Speedster Body for Car

Columbus, Nebr.—Editor MOTOR AGE—I have a Chalmers 1916 6-40 roadster. Give drawing showing what my car would look like made into a speedster.

2—Where can I buy a body for the above speedster complete, ready to bolt onto the chassis?

3—Where can I obtain aluminum pistons, rods and non-leaking rings for the Chalmers 6-40?

4—What is the size gear in this car, and how much higher can I gear it and still pull up ordinary hills?

5—What would be the approximate speed if the above changes are made?—W. A. Thomas.

1—The illustration is published in Fig. 5.

2—You would have to order a special body. There is no manufacturer making a speedster body specially for this model. A clever mechanic or sheet metal worker in your city should be able to build up a body for you.

3—Aluminum piston makers can furnish any size complete with rings. See the advertising pages of this issue.

4—We think you mean the gear ratio. This is 4 to 1. With a much lighter body you could use a gear ratio as low as 3½ to 1.

5—This can be determined only by experimentation.

WANTS TO REBUILD JACKSON 32

To Use Disk Wheels and Body Like de Palma's Mercedes

Flint, Mich.—Editor MOTOR AGE—I want to rebuild a Jackson model 32 5 passenger car into a racing speedster as cheaply as possible as I have not the necessary funds to put a lot on it. I am not after speed so much as looks. I have had road test, assembly, sheet metal work and general construction experience.

I want to put 20-gage sheet-metal disks on the wheels, a body similar to De Palma's Mercedes or as near that as possible, new carbureter if necessary, fenders, but no running boards and electric head and tail lights.

1—About what speed will this model make? Would a new carbureter help increase the speed?

2—How could I use the fenders now on car without running board so that they would look well?

3—Would you advise taping or winding cord around the springs? What is the proper way to do this?—Constant Reader.

1—The speed depends on such a great number of factors that no fair estimate can be made. A modern carbureter would very probably increase the speed.

2—As shown in the sketch, Fig. 6.

3—If the car is too springy in fast driving it would be advisable to tape the springs. The taping is performed by winding the springs with tire tape, lapping one winding over the other and progressing from one end of the spring to the other. The amount you will stiffen the springs depends on the number of layers of tape you apply.

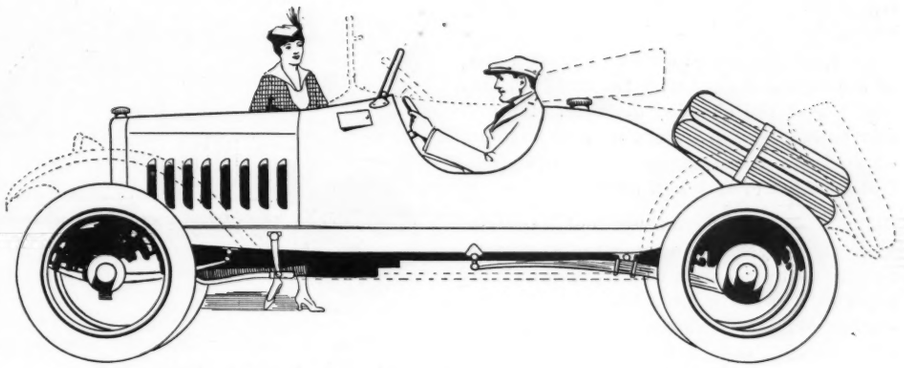


Fig. 5—Drawing showing how Chalmers 1916 model 6-40 could be rebuilt into a speedster

HOW A STEAM CAR IS REVERSED

Tests Have Shown Mileage of 10 to 15 Miles Per Gallon

LaGrange, Ind.—Editor MOTOR AGE—What is the price of a Doble steamer?

2—How is a the Doble steamer reversed?

3—Does a steam-car motor make as much noise as an ordinary gas car engine?

4—Has there been any test as to how far a Doble will run on a gallon of kerosene? If so, what mileage was obtained?

5—Is a 75-mile speedometer used as standard equipment on the Doble?—H. A. Gerberding.

1—The touring car or three-passenger roadster will sell for $2,500. The prices of other models will be announced about the first of June.

2—In the same manner a locomotive is reversed. The positions of the valves are changed so that the steam forces the piston and thus the crankshaft in the opposite direction.

3—A steam car is as quiet as an ordinary gas car; much quieter than a good many of them.

4—Tests have shown that the car will run from 10 to 15 miles on a gallon of kerosene, depending upon the roads and average driving speeds. Under fairly good conditions 13 to 14 miles per gallon is said to be the average consumption.

5—Yes.

WHAT IS MEANT BY GEAR RATIO

Explanation of "Direct on High"—Ratio Versus Tire Size

Ogallala, Neb.—Editor MOTOR AGE—Which car has the higher gear, a six or a four, both geared 4 to 1 on high; size of wheels the same?

2—Does any transmission have a "high" gear when the drive is specified "direct on high"?

3—How is gearing rated, by explosion or by revolution of crankshaft?

4—Which car is geared the highest, a four with 32 by 3½ wheels or a six with 34 by 4 wheels, both having a 4 to 1 gear on high; I mean which car would travel the most feet per mile?

5—I wish you would give the names of any manufacturers making eight-valve cylinder heads for Fords.—A Subscriber.

1—If both are geared 4 to 1 then they have the same gearing. The number of cylinders in the engine makes no difference. The gearing means the reduction in the gearbox and reduction in the rear axle. Reduction means the changing of the relative speed of the engine and rear axle, this being performed first through gears in the gearbox and second through bevel gears which conduct the drive from the propeller shaft to the rear axle.

2—All cars with sliding gear transmissions have a high gear. Direct on high means that when the high-gear setting is made with the gear-shift lever that the drive through the gearset is performed without the aid of gears—direct. In other words the shaft coming from the clutch is locked directly to the propeller shaft which leads to the rear axle by a dog or dental clutch within the gearbox so that the power from the engine is transmitted directly to the bevel gears of the rear axle without passing through gears in the gearbox.

3—As previously explained gearing has nothing to do with the engine. Gearing in a motor car serves the same purpose as it does in your watch. It is there to change the relative speed of a driving and a driven rotating object. In low speed the engine in a motor car is turning at a higher rate of speed than in high gear and inasmuch as the power of a gasoline engine increases as the speed increases up to a certain high rate of speed then the car has more pull-

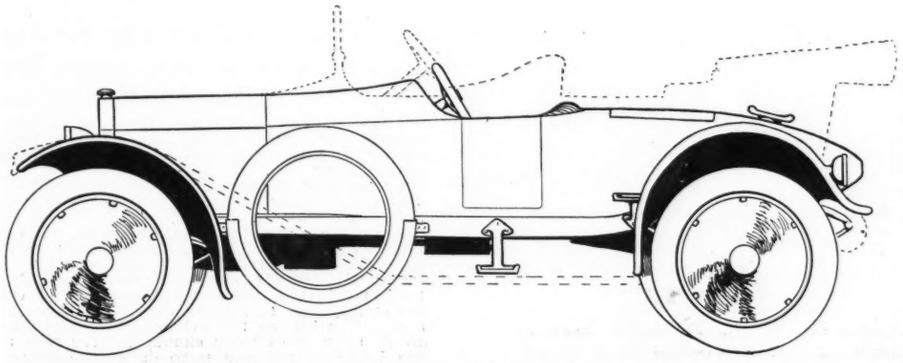


Fig. 6—Rebuilt Jackson model 32 with disk wheels and Mercedes-type body

ing power when the low speed gearing is engaged.

4—With the same number of revolutions of the engine the car with the smaller tires will travel the shortest distance. Naturally both cars will travel the same number of feet per mile inasmuch as there is a fixed number of feet in a mile.

It appears that you are not familiar with the functioning of a motor car from its engine to the tires and we are glad to explain it to you as follows. The gasoline engine rotates a clutch member which, when locked into another clutch member, causes a shaft to revolve within the gearbox. In the ordinary three-speed gearset, when high gear is engaged this shaft is locked into another shaft, the propeller shaft which then rotates in unit with the crankshaft of the gasoline engine. If intermediate or low speed is used, the shaft from the clutch and entering the gearbox causes a gear to rotate and this gear engages another gear which is on another shaft, known as the countershaft within the transmission case. Off of this countershaft is another gear which engages with still another gear on the propeller shaft. Thus the shaft from the clutch causes a gear train to rotate and these gears are of such size as to change the relative speed of the engine and propeller shaft, making the engine go much faster than the propeller shaft. In direct-drive high gear the engine turns over the same speed as the propeller shaft.

Now on the end of this propeller shaft within the differential housing on the rear axle is a bevel gear which engages another bevel gear which drives the rear axles. The bevel gear on the propeller shaft has a less number of teeth than that on the rear axle. Thus the small gear travels faster than the large gear and here we have the rear-axle reduction. If the gear reduction is said to be 4 to 1, these figures apply to the reduction in these bevel gears and it means that the propeller shaft gears turns over four times while the axle gear turns over once.

As regards tire sizes. Consider two tires of different size. The large tire will cause the car to advance a greater distance in one revolution than the small tire. This is because the distance around the large tire is greater. Although two cars may be both geared 4 to 1, if one has smaller tires than the other it will have greater pulling power than the other, considering that the engines deliver the same amount of power, due to the fact that the car will travel a shorter distance with the same number of revolutions of the engine.

5—The cylinder head of the Ford itself is eight valve. There are two valves per cylinder. If you refer to a sixteen-valve head, these are being manufactured by Robert M. Roof, Anderson, Ind., and T. R. Noonan, Paris, Ill.

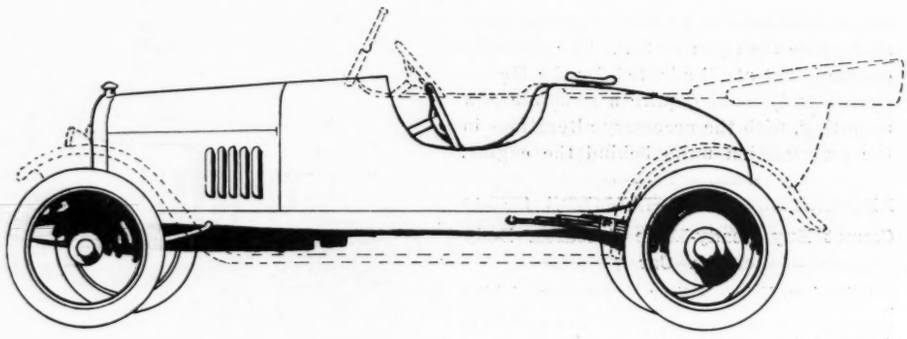


Fig. 7—Enger 1916 model with speedster body using so-called bee-hive back

Readers!

Can You Help These Inquirers?

Touring Car-Ambulance

I want a list of people who are prepared to build for me a combination inclosed touring car and ambulance on a Hudson Super-Six chassis.—C. F. French.

Dressing for Grey Leather

The upholstery on my Michigan car is grey leather. I want a dressing that will preserve the leather and retore the color at the same time. If there is no such dressing offered to the trade, can you suggest a mixture that will do it?—Stuart M. French.

Gasoline Consumption Meter

Is there on the market a gasoline meter that can be attached to a car to measure and record the amount of gasoline used?—J. R. Johnson.

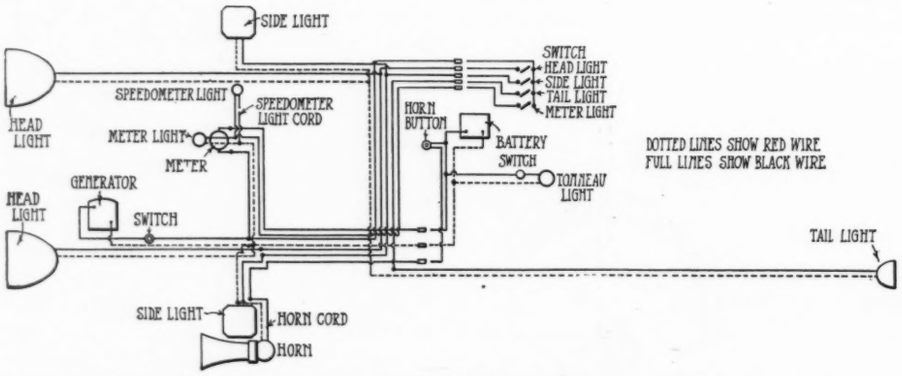


Fig. 8—Complete wiring of 1912 Stearns-Knight showing how voltometer should be connected with lights, generator and battery. This was promised to A Reader, East St. Louis, Ill., in the April 19 issue of MOTOR AGE

CHALMERS SIX-30 GEAR RATIOS

Same Oil Used in Gearset as in Engine—Gear Ratios Given

Canton, O.—Editor MOTOR AGE—In what issue of MOTOR AGE appeared a description of the seven-passenger Chalmers 6-30?

2—What is the ratio of the gearbox gears on this car?

3—What is the gear ratio of the five-passenger Chalmers 6-30?

4—What kind of grease should be used in the gearset of these cars? The instruction book says gas engine oil. Does that mean the same oil that is used in the engine?

5—What size of fuses are used on the seven-passenger car and what is the amperage?—A Reader.

1—Jan. 4, 1917.

2—The gear ratios in both six 30 models are:

High speed	1 to 1
Second speed	1.93 to 1
First speed	3.38 to 1
Reverse	4.5 to 1

3—The rear axle ratios are as follows:

Six-30, five-passenger	4.75 to 1
Six-30, seven-passenger	5.18 to 1

4—The same oil as is used in the engine should be used in the gearbox.

5—The fuses used on the model six-30 are as follows: Five fuses, type 3, 15 amp., 6 volts. Two fuses, type 5G, 30 amp., 6 volts.

The type 3 fuse is of ¼-in. diameter and $1\frac{3}{16}$ in. long and the type 5G fuse, ⅜ in. diameter and 1½ in. long.

Enger Made a Racer

Buffalo, N. Y.—Editor MOTOR AGE—Show diagram how 1916 Enger twin-six could be made a racer with so-called beehive in back. —J. I. Rains.

The diagram you ask for is shown in Fig. 7.

LIGHT PARTS OR SIXTEEN VALVES

Least Expensive to Refine Present Ford Engine

Anthony, Kan.—Editor MOTOR AGE—I have lightened my Ford engine for sped purposes and before assembling, would like the following information:

I have lightened the connecting rods and used .031 oversize aluminum pistons. They weight respectfully 3 lbs. 4 ounces each, which is exactly the same on druggist scales. I enlarged the valve $\frac{3}{16}$ in. and reamed out valve parts ⅛ inch and used Dodge valves which I lightened down all they would stand, polishing them until they are perfectly smooth. I cut the stems down to regular Ford size. I placed a partition betwen the flywheel and crank pan which holds the oil dep enough for the rods to dip into and removed magnets from flywheel, installing six brass plates to throw the oil up

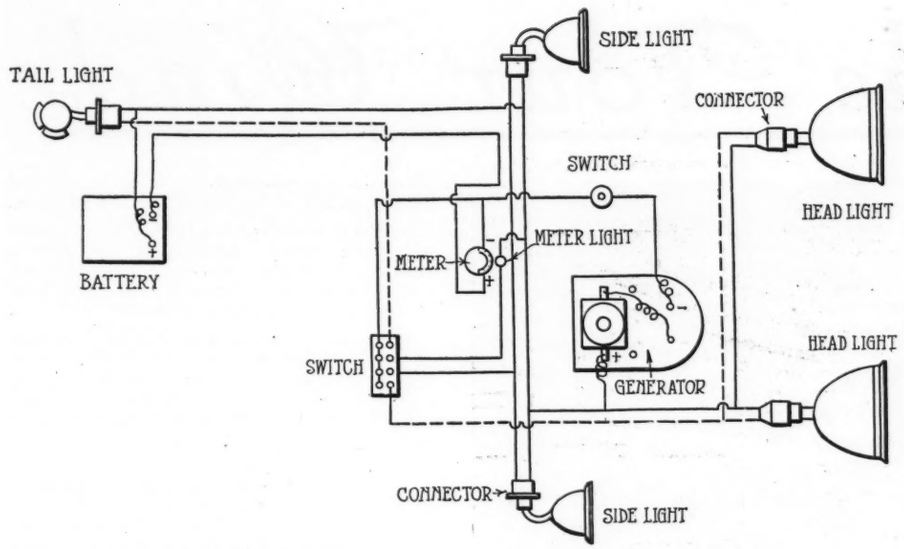


Fig. 9—Wiring diagram of **1912** *Velie model M equipped with Vesta generator*

into pan. I am installing Bosch magneto and 1¼-inch Rayfield carbureter.

I have the lowered frame until the driveshaft is directly on a line with the crankshaft and installed 28 by 3 wheels with 2 4/7 to 1 gear.

With the proper balancing of all parts, do you think it would be possible to obtain 60 m.p.h?

Would it be better to install a sixteen-valve attachment? Would it justify itself in increased acceleration over the above changes, providing I have balanced everything correctly?—James J. Costa.

This car should be capable of 60 m.p.h. if not more. The sixteen valve attachment should increase the power of your engine by about 10 per cent and certainly the increased ability to accelerate rapidly and the greater engine speed and consequent car speed would be as well devised from this alteration as from the balancing. Better to combine them if it is within your purse.

WIRING DIAGRAM OF 1912 VELIE

Could Not Change Springs Without Prohibitive Expense

Milwaukee, Wis.—Editor MOTOR AGE—Publish wiring diagram of the 1912 Velie, Model M, equipped with a Vesta generator.

2—What is the horsepower of this model?

3—Would it be possible to change the rear springs and use an extra bracket riveted on the frame similar to the F. R. P. and Maxwell cars?

4—What is the ratio of this car on high?

5—Could more speed be obtained if the tires are changed from 36 by 4 to 34 or 33 by 4½ for the rear and 32 or 33 by 4 for the front?—A Reader.

1—The wiring diagram is shown in Fig. 9.

2—The maximum horsepower of this model according to brake test is claimed to be 45. The N.A.C.C. rating is 32.4.

3—Not without installing a new frame and in this old model the cost of such an alteration would be prohibitive.

4—The gear ratio on high is 3 13/14 to 1.

5—The speed would not be increased and would probably be reduced due to the fact that the engine would have to turn over more times for a given distance of car travel.

Wiring of Regal

Souris, N. D.—Editor MOTOR AGE—Publish a wiring diagram of the 1916 four-cylinder Model D Regal.—Carl Kroger.

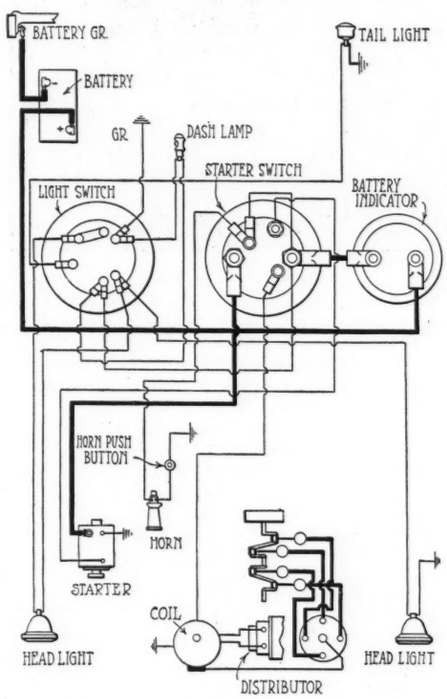


Fig. 10—Wiring of Dyneto and Connecticut systems as combined on **1916** *Regal*

1—The complete wiring of the Dyneto starting and lighting system and the Connecticut ignition system used on this car is shown in Fig. 10.

F. R. P. Construction Details

Springfield, Mo.—Editor MOTOR AGE—Answer the following questions concerning the F.R.P. car which is now being manufactured at Port Jefferson, L. I.:

1—Is this a sixteen-valve engine?

2—Are the valves located in the cylinder heads?

3—What is the clear diameter of the valves?

4—Are the valves actuated by push rods or overhead camshaft?

5—What is the diameter of the crankshaft?

6—What road sped should the model 45 equipped, with a four passenger body, show?—Hal. S. Miller.

1—Yes.

2—Yes.

3—The clear diameter is $1\frac{13}{16}$ in.

4—The valves are actuated by an overhead comshaft and rocker arms.

5—The diameter of the crankshaft is 2½ in.

6—There is no official record of the speed of this car.

Studebaker 25 Data

Toledo, Ohio.—Editor MOTOR AGE—What make of engine was used in the Studebaker 25, 1913 model, or did the Studebaker people make this engine themselves?

2—What type of Splitdorf magneto is used on this car?

3—What make nad model of carbureter was used on this car?—Reader.

1—It is equipped with a 25 hp. engine manufactured by Studebaker.

2—Splitdorf model No. C.

3—Manufactured by Holly Bros., Detroit, and known as the Holly.

Ammeter on Grant

Manzanola, Colo.—Editor MOTOR AGE—Give wiring diagram of a Grant Six Model T. 1915 for putting on an ammeter. This car has no polarity switch. I tried to wire one in as you have diagrammed on page 46 in the Feb. 8th issue and it did not seem to work. What is the matter?—John L. Clowes.

The diagram published in Fig. 11 shows the only method of connecting an ammeter to this model. If you find that this does not work in your car describe wherein the wiring in your car is different than the diagram shows and we will tell you what the trouble is.

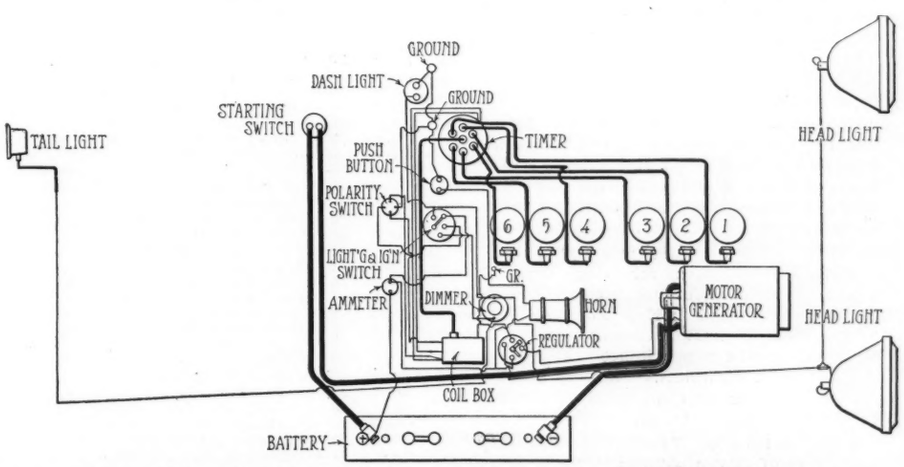


Fig. 11—Wiring diagram of Grant six Model T. **1915**, *showing method of connecting ammeter*

From the Four Winds

A CAR THAT IS AT HOME—The canopy top originated at the Los Angeles branch of the Studebaker Corp. of America there. When this top is used, the ordinary standard top is folded down in its customary position, and the parasol is raised and lashed by four clip and spring guy lines. It is for ocean bathers especially. The canopy and curtains make an inclosed car for the beach. The Studebaker company makes a car with the seats adapted to use as a bed, and when the new top is mounted an ideal camping combination is had.

SHRINERS Plan June Run—The Za-Ga-Zig Shrine Auto Club of Des Moines, Iowa, has planned a run to St. Paul, Minn., for June 23-24. About 125 cars are expected to enter. The club is the second Shriner motor club in the United States, the first being the Lulu at Philadelphia. It has about 225 members.

Columbus Club Pledges Services—More than 300 members of the Columbus Automobile Club have pledged their support to the federal government and have promised to drive motor cars or trucks in case they are called upon.

Olds Parks 40 Acres—The Olds Motor Works, Lansing, Mich., is parking 40 acres near its plant for the benefit of the employes. Rustic benches, tables and summer houses will provide picnic grounds and a baseball diamond, grandstand and tennis courts will be arranged.

Columbus Club Gives Armored Car—The Athletic Club of Columbus, Ohio, one of the largest social clubs in the Buckeye capital, has purchased and manned an armored car and will tender it to the Federal Government for whatever use it sees fit. The cost of the car was obtained by subscription.

Motor Ambulances for Red Cross—Ten motor ambulances for use with military base hospitals organized in New York were given to the New York Red Cross recently. Five of them, to cost approximately $10,000, were the gift of J. H. Schiff. Each of these machines will carry four wounded men reclining or eight sitting.

Black and Yellow Trail Organizes—Representatives of eleven counties along the Black and Yellow trail met at Pierre, S. D., recently and formed the Chicago, Black Hills and Yellowstone Park Highway Association. Thirty-four charter members were present. The association will promote the development and advertisement of the Black and Yellow trail.

Montreal to Show Used Cars—The Montreal Automobile Trade Association will hold a used-car show May 26-June 2. All cars exhibited must be in running order and pass inspection of a special committee.

Few Cars in Great Britain—Great Britain has about 5 per cent as many motor cars as this country has, or 171,607. New York, Ohio, Pennsylvania, Illinois, California, Texas and Iowa each have more cars than has Great Britain.

New Road Through Ford Farm—Plans have been approved for a new gravel road from Wildwood to Cape May, N. J. This new highway will extend through the 400-acre farm recently purchased by Henry Ford, adjoining Cape May harbor. It is expected to be one of the most important links of the Ocean boulevard.

Motor Vehicle Receipts Smash Records—The receipts of the motor vehicle department of New Jersey for the first quarter of 1917 show an increase of $371,569 over the corresponding period last year. The receipts for January, February and March total $1,156,682. The state has licensed 8584 new drivers since Jan. 1.

Even Gypsies Are Motorizing—Forty-three gypsies and six dogs left Chicago recently for the South, where they will spend their summer vacation. They have a regular schedule, which will take them to New York and south and west through Texas to Los Angeles, north to San Francisco and back to Chicago by next November. The "wagons" were seven Hudson cars.

Illinois Dealer and Chauffeur Increase—During the first quarter this year chauffeur permits and dealer licenses were 23,932 and 2397, respectively, as compared to 16,518 and 1724 in 1916 and 10,654 and 855 in 1915. About twice as many motor car licenses were issued during the first quarter of this year compared to 1916, or 174,555.

Land Preparedness at Metz—The Metz company also has gone in for preparedness by alloting to its working forces sections of land surrounding the factory, on which to plant during the summer, so that they can raise foodstuffs. The company has 40 acres of good soil, and most of this is available for the purpose. The men and women will be given time to attend to the farming two times during a day.

Red Lights on All Vehicles—Additions to the motor vehicle and road laws passed by the New Jersey legislature provide that all horse-drawn vehicles must be equipped with a red light plainly visible in the direction from which the vehicle is proceeding. A provision to prohibit the use of spot lights on motor vehicles was included. An amendment to the reciprocity section of the law grants reciprocal privileges to Canadians.

Now It Is the Rubber City—How many know that Akron, Ohio, has been successively the Oatmeal City, the Match City, the Mower and Reaper City, the Sewer Pipe City and the Rubber City? During these changes it has grown from a village of less than 10,000 to a city of more than 120,000. J. F. Seiberling, who years ago made Akron known as the Mower and Reaper City, was the father of President F. A. Seiberling of the Goodyear Tire & Rubber Co., who has done so much to help make the city known as the Rubber City.

Coming Motor Events

CONTESTS
—1917—

May	10	Uniontown, Pa., speedway.
May	19	New York, speedway.
May	30	Walla Walla, Wash., track.
May	30	Uniontown, Pa., speedway.
May	30	Cincinnati, Ohio, speedway.
June	16	Chicago, speedway.
June	23	Cincinnati, Ohio, speedway.
July	4	Visalia, Cal., road race.
July	4	Spokane, Wash., track.
July	4	Benton Harbor, Mich., track.
July	4	Uniontown, Pa., speedway.
July	4	Tacoma, Wash., speedway.
*July	4	Omaha, Neb., speedway.
July	15	Missoula, Mont., track.
July	17-19	Intercity Reliability.
July	22	Anaconda, Mont., track.
July	29	Great Falls, Mont., track.
Aug.	5	Billings, Mont., track.
*Sept.	3	Cincinnati, Ohio, speedway.
Sept.	6	Red Bank, N. J., track.
Sept.	8	Pike's Peak, Colo., hill climb.
*Sept.	15	Providence, R. I., speedway.
Sept.	22	Allentown, Pa., track.
Sept.	28	Trenton, N. J., track.
*Sept.	29	New York, speedway.
Sept.	30	Uniontown, Pa., speedway.
Oct.	6	Uniontown, Pa., speedway.
Oct.	6	Danbury, Conn., track.
*Oct.	13	Chicago, speedway.
Oct.	13	Richmond, Va., track.
Oct.	27	New York, speedway.

* A. A. A. Championship Award Event.

Among the Makers and Dealers

CHICAGO Concern Increases Stock—The Chicago Auto Equipment Co. has increased its capital stock from $2,500 to $15,000.

Goddard to Be Transferred—H. A. Goddard, connected with the Perfection Spring Co., Cleveland, Ohio, and located in New York, will soon be transferred to Detroit.

Roberts Hess-Bright Comptroller—C. H. Roberts has been appointed comptroller of the Hess-Bright Mfg. Co., Philadelphia, Pa. He was formerly factory accountant.

To Distribute Sexton Oil—E. G. Sherman, Los Angeles, Cal., has obtained the distributing rights for Sexton castor motor oil in California, Nevada and Arizona. Two carloads have gone forward to Mr. Sherman and others will be shipped at once.

Peoria, Ill., Association Elects—The Peoria Automobile and Accessory Dealers' Association has elected the following officers for the coming year: President, H. B. Pinkerton; vice-president, C. E. Lyall; secretary, R. F. Fitch; treasurer, R. F. Graham.

Pennsylvania Rubber Encourages Planting—The Pennsylvania Rubber Co., Jeannette, Pa., has turned over to its employes the extensive acreage around its large plant. The land will be allotted in sections for planting. Each employe will receive the profit from the crop on his section when it is marketed.

Willard Storage Adds Department—The Willard Storage Battery Co., Cleveland, Ohio, has added a department which will be devoted to the supervision of the service stations. A. C. Hyser, formerly branch manager at Atlanta, Ga., will have the position of general supervisor of service.

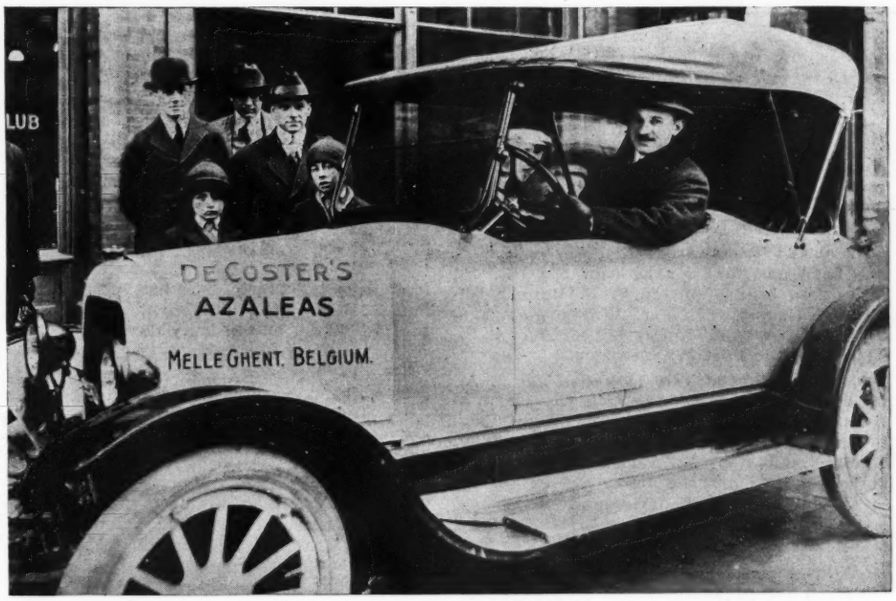
Daniels Leaves Kissel—H. S. Daniels, manager of the publicity department of the Kissel Motor Car Co., Hartford, Wis., has resigned to join the Dort Motor Car Co., Detroit. Ralph Kay, now with the advertising department of the Stewart-Warner Speedometer Corp., Chicago, succeeds Mr. Daniels.

Clark Heads K. C. Association—A. T. Clark, manager of the Anderson Electric Car Co. at Kansas City, Mo., has been elected president of the Kansas City Motor Car Dealers' Association. He succeeds A. F. Norton, who resigned. R. C. Greenlease, president of the Greenlease Motor Co., Cadillac dealer, was elected vice-president.

Pan-American Contracts for Building—The contract was let this week for the initial building of the Pan-American Automobile Co., Decatur, Ill., and the work of construction will be pushed. The first structure will be 100 by 250 ft. and will cost $25,000. The contract requires the completion of the job by June 1. Other buildings will be added from time to time.

Lewis Motor Corp. a Separate Concern—The Lewis Motor Corp., Detroit, announces that it has no connection with the L. P. C. Motor Co., former maker of the Lewis VI motor car at Racine, Wis., nor does it handle any parts for these cars. The Lewis six-cylinder engine is entirely new and is designed by Ralph C. Lewis. Engines only are made for the trade by the Lewis Motor Corp.

New Men Join Diamond T—G. A. Gibson has been appointed production manager of the Diamond T Motor Car Co., Chicago. Mr. Gibson has been with the Packard, White and G. M. C. companies and comes now from Kansas City, where he had charge of the motor truck division of the Packard there. Carl Burton from the Packard organization will have charge of material at the Diamond T company. J. P. Burris comes from the Packard Motor Car Co. of New York to join the sales organization.



DUTCH FLORIST BUYS CAR—Pereboom of Sassenheim, Holland, bought this Briscoe and will visit wholesale florists in New England in it, having the car shipped to Holland when he returns. The car is decorated with water color paintings that depict Dutch bulbs and Belgian azaleas.

Standard Motor Carriage Co. Formed—The Standard Motor Carriage Co., Washington, has been incorporated with a capital of $13,100,000 to make motor cars, etc.

Butler Mfg. Co. to Expand—Although the Butler Mfg. Co. is just celebrating its first birthday in Indianapolis, Ind., it is planning to double its equipment this month and to increase it even more in October.

Famous Trucks to Begin Operation—The Famous Trucks Mfg. Co., a new concern at St. Joseph, Mich., has taken over the plant of the Deitch-Denton company and will start operations there as soon as men can be brought from Chicago.

Agency to Sell or Rent Trucks—The Equipment Motor Truck Co. has been incorporated for $50,000 at St. Louis, Mo., and will sell or rent trucks to business houses. Harry J. Dunker of Chicago is manager and W. A. Yackey is sales manager. The lines handled are: Atlas, Atterbury, Winther, Gramm-Bernstein and Bethlehem.

$150,000 Plant for Comet Company—The architects have completed the plans for the buildings of the Comet Automobile Co., Decatur, Ill. The principal structure will be 600 by 150 ft. The estimated cost of the main building, office building and power house is $150,000. The progressive system of assembling will be adopted, all parts entering the building at one end and the finished car emerging from the other.

Champion Spark Adds Delivery Cars—The delivery car method of distributing window displays and advertising matters from one end of the country to the other, adopted by the Champion Spark Plug Co., Toledo, Ohio, a few months ago, has proved so successful that the company is adding five more cars to its fleet of five Overlands. The two Overland delivery cars which made a record run from Toledo, Ohio, to San Francisco, Cal., early this year will remain on the western coast.

Templar Buys Plat for Plant—The Templar Motors Corp., Cleveland, Ohio, has acquired a 14-acre site and will erect a motor car plant.

Jenney to Detroit Motor Lock—C. D. Jenney has been appointed chief consulting engineer for the Detroit Motor Lock Co., Detroit. Mr. Jenney is an electrical engineer who has invented several motor car accessories.

500 Cars in Overland Driveaway—Dealers for Overland broke all records for Willys-Overland driveaways recently, when more than 500 cars were driven away in two days. One hundred and five cars were driven to Erie, Pa., and others were driven to points as far distant as Louisville, Ky., Harrisburg, Pa., and Kalamazoo, Mich.

Hoosier Iron Works Starts Production—The Hoosier Iron Works, Kokomo, Ind., has started its gray iron foundries with a capacity of 50 tons a day. The concern will cater almost exclusively to the motor trade. The officers are: President, J. W. Johnson; vice-president, George Kingston, and secretary and treasurer, J. P. Grace. John Fogarty is general manager.

U. S. Truck Starts French Contract—The final week in March witnessed the boxing of the first consignment of U. S. motor trucks for shipment to France in fulfillment of the contract obtained by the United States Motor Truck Co., calling for the delivery of twenty of the 5-ton trucks a month, beginning in April. The trucks are to be used for business purposes and are not war orders.

McIntyre Refuses Order for Export—The McIntyre Mfg. Co., Columbus, Ohio, has refused to consider an order from an exporting house for 1500 Farmer Boy tractors, because of the accumulation of orders on its books. These were intended for Russia, Siberia and South America. The company has a standing order for twenty-five tractors from London each week but has not been able to keep

up to that schedule. The new factory is almost complete, and the output is to be increased.

Utility Tractor Co. Incorporates—The Utility Tractor Co., capitalized at $1,000,000, has been formed by J. F. Burke, J. F. Burke, Jr., and others of New York.

Scholl Joins Leavett Co.—H. W. Scholl has become director of sales of the Walker M. Leavett Co., New York, maker of Magnalite pistons and other parts. He was formerly sales engineer of the Splitdorf Electrical Co., Newark, N. J.

Dixie Securities Corp. Is Formed—The Dixie Securities Corp. has been organized in New Orleans, La., and chartered under the laws of Delaware for $1,000,000 to handle motor car paper. The company has absorbed Motor Securities Co.

French Is Transferred—E. B. French, who has been assistant manager of the Harrisburg, Pa., branch of the S. F. Bowser Oil Tank & Pump Co. of Fort Wayne, Ind., has been made assistant to Eastern Manager R. S. Colwell at the Fort Wayne office.

400 Make Special Trip to Velie—The J. A. O'Leary Automobile Co., Iowa City, ran a special train to Moline, Ill., to enable patrons to inspect the Velie motor car factory. Four hundred made the trip. Luncheon was served at the plant, and the party was escorted through the various departments. Sixty-five members of the party placed orders for as many cars following the inspection.

2000-Ton Press for Overland—The Willys-Overland Co. is installing one of the largest steel presses in its plant. The new press, which makes side rails for motor cars, has a pressure of 2000 tons and will press pieces of steel 17 ft. long and ⅜ in. thick. It is 31 ft. high and 20 ft. wide and is embedded in 15 ft. of solid concrete. Four men operate this machine daily and turn out 2000 side rails each 8 hrs.

Goodyear Adopts Metric System—The Goodyear Tire & Rubber Co., Akron, Ohio, has decided to adopt the metric system of weights and measures as far as possible in all its work. Classes in the factory school have been organized among the foremen and inspectors to familiarize them with the system before its application. The tires that American rubber manufacturers export to other parts of the world are stamped in millimeter sizes as it is. In measuring liquids and solids the cubes of these units are used.

Rex Company Expands—The Rex Mfg. Co., Connersville, Ind., maker or sedan tops, will erect an addition to its plant. The new building will be three stories high with basement, 100 by 60 ft.

Fisher Declares Dividend—The Fisher Body Corp., Detroit, has declared a regular quarterly dividend of 1¾ per cent on its preferred stock, payable May 1 to stock of record April 20.

Amazon Increases Production—The Amazon Rubber Co., Akron, Ohio, has added more floor space and is running double shifts to enable the factory to make immediate shipment of all orders. A shortage of tires is expected.

Gerhart Becomes Monitor Superintendent—W. J. Gerhart has been appointed superintendent of the Monitor Motor Car Co., Columbus, Ohio. The concern has made changes and additions that will enable it to double the production within sixty days.

Murry Plant for Cleveland—The J. W. Murry Co., Detroit, will have a plant in Cleveland. A factory of 100,000 sq. ft. of floor space is to be provided and a new Ohio company will be incorporated with a capital of $500,000. The company manufactures sheet metal parts.

Using the Screen to Make Sales—E. W. Abrogast, head of the newly organized Missouri Tractor Sales Co., is bringing the factory to his dealers by specially made moving picture films of the Staude Mak-a-Tractor. Private exhibitions are given for groups of dealers in various county seat towns.

Schlecht Heads St. Louis Organization—Joseph A. Schlecht of the Mound City Auto & Buggy Co. has been elected president of the St. Louis Automobile Manufacturers' and Dealers' Association. The other officers are: Vice-president, H. C. Fahrenkrog, Kardell Motor Co.; treasurer, Herman L. Schnure of the Velie Automobile Co.

Lewis and Gilson Form Company—Capt. William Mitchell Lewis, former president and general manager of the Mitchell-Lewis Motor Co., Racine, Wis., and James W. Gilson, a former associate official in the concern, have incorporated the Western Coil & Electrical Co., Racine, with a capital stock of $30,000. Mr. Gilson some time ago established an electrical goods manufacturing plant in Chicago, and this now will be moved to Racine.

Brodix Is Killed by Train—Wyatt Brodix, motor car editor of the St. Louis Republic, was killed by a train recently while on an outing. Until six months ago he had been connected with the Marmon sales offices in Indianapolis.

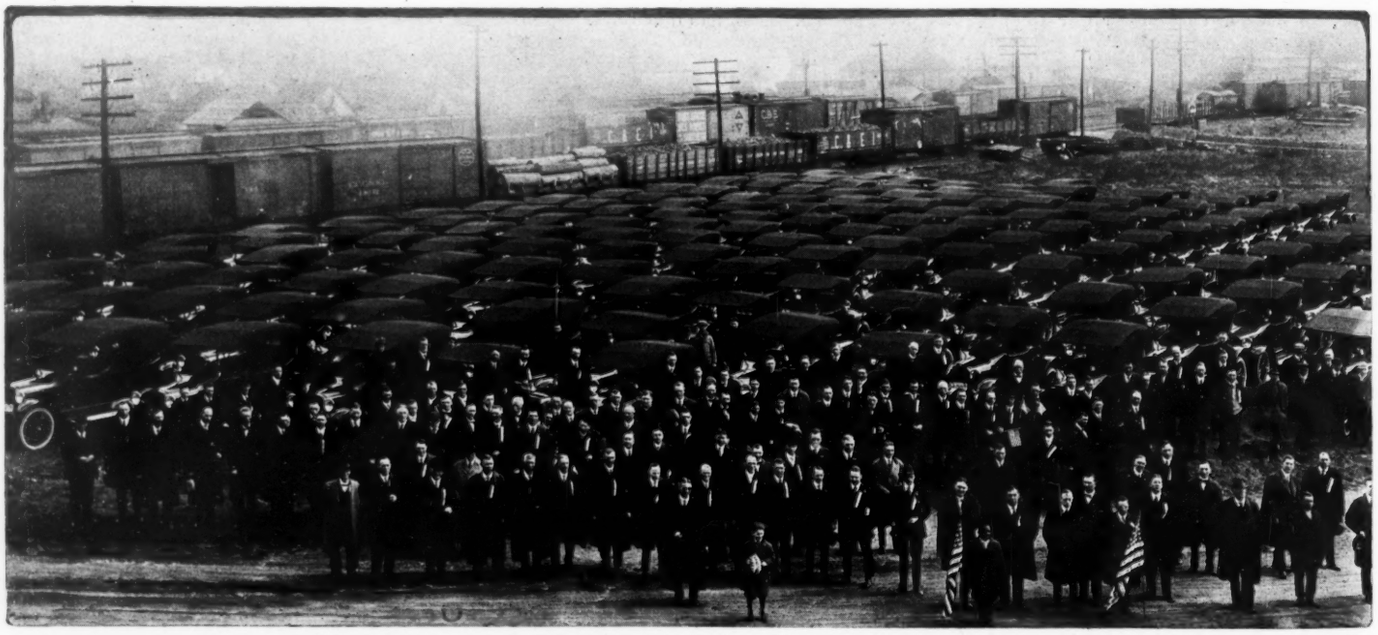
Bush Leaves Advance-Rumely—Vernon E. Bush, vice-president and assistant sales manager of the Advance-Rumely Co., Laporte, Ind., has resigned his position and will leave May 1 for New York, where he will become associated with the White Motor Truck Co., taking a position in the foreign sales department.

Changes in Johns-Manville Personnel—J. D. Vail, former manager of the Salt Lake City office of the H. W. Johns-Manville Co., has been appointed manager of the building materials department of the Chicago branch. The Salt Lake City office will be managed by C. F. Cate. J. H. Roe has been appointed manager of the Great Falls, Mont., office, which will be independent of Salt Lake City.

Motors Metal Mfg. Co. Moves—The Motors Metal Mfg. Co., Detroit, formerly the Holihan Mfg. Co., has moved into its new plant. The main building of the plant is 400 by 80 ft., and the company has purchased its own sidetracks. New officers have been elected as follows: C. R. Talbot, president; H. A. Burnett, vice-president; William Christian, secretary-treasurer and general manager.

Wolverine Motor at Battle Creek—The Wolverine Motor Corp. will build a plant to manufacture motor cars at Battle Creek, Mich. A. H. Collins, the designer and promoter of the new plant, formerly was with the Locomobile Co. The company states it now has orders for 600 cars, which will be the first year's output. These orders have come from twenty-five dealers about the country, who have subscribed $1,000 each in the firm.

Racine Motor Truck Co. Organized—The Piggins Bros., Racine, Wis., who announced a short time ago their intention to engage in the manufacture of motor trucks on a large scale, have organized the Racine Motor Truck Co. with a capital stock of $50,000 and will establish a plant at once. The backers of the company are Charles P. and Fred H. Piggins, wagon, truck and axle builders, and Ira L. Miller, Los Angeles, Cal.



DISTRIBUTOR TAKES AWAY 175 CARS AT ONCE—April 7 was Inter-State Indiana driveaway day. Under the auspices of the Kanouse Automobile Co., 175 cars were taken that day, as shown above.